

# RECLAMATION

*Managing Water in the West*

## Annual Operating Plan

### Fryingpan-Arkansas Project

Water Year 2018

Summary of Actual Operations  
and

Water Year 2019

Annual Operating Plans



Pueblo Reservoir



U.S. Department of the Interior  
Bureau of Reclamation  
Great Plains Region

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# Project Highlights

August 16, 1962	Project authorized under Public Law 87-590
August 1964	Construction began on Ruedi Dam
November 2, 1965	Started excavating Charles H. Boustead Tunnel
December 1965	Construction began on Sugar Loaf Dam
April 15, 1968	Breached old Sugar Loaf Dam
May 1968	Began storing water in Ruedi Reservoir
June 15, 1969	Charles H. Boustead Tunnel "holed through"
July 1970	Construction began on Pueblo Dam - first contract
May 16, 1972	Initial Project diversion (Chapman, South Fork, and Fryingpan)
June 7, 1972	Initial diversion from Sawyer Creek
July 1972	Construction began on Pueblo Dam - second contract
July 1972	First sale of Project transmountain water
January 9, 1974	Began storing water in Pueblo Reservoir
May 6, 1974	Initial diversion from Lily Pad
May 4, 1976	Initial diversion from Ivanhoe Creek
May 1977	First replacement water released from Ruedi Reservoir
June 1977	First sale of water from Ruedi Reservoir
November 22, 1977	Adopted the recommended bypass flow of 15 cfs or natural inflow, whichever is less on Lake Creek below Twin Lakes Dam
June 1, 1979	Initial diversion from Middle Cunningham Creek
June 4, 1979	Initial diversion from Mormon Creek
June 14, 1979	Initial diversion from North Cunningham Creek
May 8, 1980	Initial diversion from Hunter, Midway and No Name Creek Diversion
June 4, 1980	Initial diversion from North Fork and South Cunningham
December 8, 1980	Federal Register notification of availability of water from Ruedi Reservoir
April 28, 1981	Initial diversion from Carter
May 6, 1981	Initial diversion from Granite Creek
June 1, 1981	Assume operation at Twin Lakes Dam
June 23, 1981	Mt. Elbert Forebay filled
September 29, 1981	Mt. Elbert Power Plant dedicated
October 1, 1981	Mt. Elbert Unit #1 was made commercially available to WAPA for their use
May 5, 1982	Initial diversion from Halfmoon Creek
July 29, 1982	Turquoise Lake filled for first time
September 14, 1983	Initial diversion from south outlet works at Pueblo Dam for Pueblo West
August 9, 1984	Mt. Elbert Unit #2 was made commercially available to WAPA for their use
May 24, 1985	Began storing water under Arkansas River Decree

July 1, 1985	Initial diversion through Fountain Valley Conduit
August 1985	Ruedi Hydroplant began operations
November 27, 1985	Twin Lakes pipeline began operations
May 7, 1986	Sugar Loaf Hydroplant began operations
June 1986	Imports restricted due to high east slope storage
November 10, 1987	Winter water storage decree approved and signed
November 17, 1989	Completed the removal of dikes and constructed the bypass channel around the old outlet works in the old Twin Lakes dam
August 14, 1990	July 1990 Initial release from Twin Lakes Reservoir for recreational benefits on the Arkansas River Initial release from Ruedi Reservoir for endangered fish (conservation flows pursuant to the biological opinion) in the Colorado River's "15-mile reach" for the U.S. Fish & Wildlife Service from water leased by the Colorado Water Conservation Board
September 28, 1990	Dedication of Pueblo Fish Hatchery and the completion of construction on the Fryingpan-Arkansas Project ceremony
November 1990	Final winter storage decree signed by court
July 21, 1992	Dedication of Leadville Mine Drainage Tunnel Water Treatment Plant
September 29, 1994	Transfer of Phase II of the Pueblo Fish Hatchery at Pueblo Reservoir to Colorado Division of Wildlife
May 15, 1995	Final transfer of recreational facilities at Pueblo to the Department of Parks and Outdoor Recreation
July 7, 1995	Began storing water under Arkansas River Decree
July 18, 1995	Began restricting imports due to high east slope storage
July 1997	Reservoir level at Pueblo Reservoir restricted after a routine risk assessment of Pueblo Dam was completed and raised concern about the foundation below the spillway section of the dam
May 1999	Reservoir restriction lifted
July 2000	Risk Analysis Study for Pueblo Dam completed
July 11, 2000	Long-term contract between United States government and the Pueblo Board of Water Works executed.
September 11, 2001	As a result of the terrorist attacks on September 11, 2001, all Fryingpan-Arkansas Project facilities were closed to the public. The facilities remained closed until security measures to safeguard the federal investment were implemented. Reclamation has maintained a heightened level of security at Fry-Ark facilities since that time.
July 23, 2002	Initial release of water through Pueblo Board of Water Works south outlet works joint-use manifold
September 12, 2007	Long-Term Contract between the United States Government and the city of Aurora executed
May 2010	The upgrade to the control and monitoring system for the Fryingpan-Arkansas collection system was completed.

September 2012	Fiberoptic control of west slope systems from the east slope
April 28, 2016	Southern Delivery System began water deliveries
August 10, 2016	Lease of Power Privilege signed with SECWCD for the construction, operation, maintenance and replacement associated with hydropower at Pueblo Dam
October 1, 2016	If and When Master Contract in effect

# **Annual Operating Plan Fryingpan-Arkansas Project Water Year 2018 Operation**

## **General**

This is the 50 annual operating plan (AOP) for the Fryingpan-Arkansas Project. The project, completed in 1990, imports spring snowmelt runoff from Colorado's west slope to the semi-arid Arkansas River Basin on Colorado's east slope. The project consists of federally owned dams, reservoirs, stream diversion structures, conduits, tunnels, pumping plants, a pumped-storage power plant, electric transmission lines, substations, and recreation facilities. These features are located in the Fryingpan River and Hunter Creek watersheds of the upper Colorado River Basin, and in the Arkansas River Basin in central and southeastern Colorado. The project provides water for irrigation, municipal and industrial use, hydroelectric power generation, recreation, and wildlife habitat. The project also provides for flood control.

The project was authorized under Public Law 87-590 on August 16, 1962. This law provides that the project will be operated under the operating principles adopted by the state of Colorado on April 30, 1959, as amended on December 30, 1959, and on December 9, 1960. These operating principles were published as House Document 130 (87th Congress, 1st Session), and are included in Appendix E.

This annual operating plan is a summary of the actual project operation in Water Year (WY) 2018 (October 1, 2017 through September 30, 2018).

## **Project Features In Operation During Water Year 2018**

Ruedi Dam and Reservoir are located on the Fryingpan River, a tributary of the Roaring Fork River, on Colorado's west slope about 13 miles east of Basalt, Colorado. Ruedi Reservoir has a total capacity of 102,373 acre-feet (af) at a water surface elevation of 7,766.0 feet. The reservoir is operated on an annual cycle. Steady winter releases draft the reservoir such that it is filled with the spring runoff, while releases to the Fryingpan River are maintained below the safe channel capacity. The reservoir provides replacement water for out-of-priority depletions to the Colorado River by the project as well as water for west slope irrigation, municipal, and industrial uses on a contractual basis. The reservoir is also operated to provide for recreation and wildlife habitat.

The west slope collection system, located upstream of Ruedi Reservoir in the upper Fryingpan River and Hunter Creek watersheds, is a series of 16 stream diversion structures and eight tunnels. The system collects spring snowmelt runoff for diversion, by gravity, to the inlet of the Charles H. Boustead Tunnel. The Boustead Tunnel conveys water collected by the west slope collection system under the continental divide and into Turquoise Lake on the east slope. The tunnel is 5 miles long and has a water conveyance capacity of 945 cubic feet per second (cfs).

Sugarloaf Dam and Turquoise Lake are located on Lake Fork Creek, a tributary of the Arkansas River, about 5 miles west of Leadville, Colorado. The lake has a total capacity of 129,398 af at a water surface elevation of 9,869.4 feet. The lake is operated to provide regulation of both project and non-project water imported from the west slope. Turquoise Lake is operated on an annual cycle. The lake is drafted through the Mt. Elbert Conduit during the winter to provide adequate space for the spring imports of west slope water. Most of the native inflow from Lake Fork Creek is impounded in the lake and returned to the Arkansas River via the Mt. Elbert Conduit, the Mt. Elbert Power Plant, and Twin Lakes. The lake is also operated to provide for recreation and wildlife habitat.

The Mt. Elbert Conduit conveys project, non-project, and native Lake Fork Creek water from Turquoise Lake to Twin Lakes. The conduit is 10.7 miles long and has a water conveyance capacity of 370 cfs. Native water from Halfmoon Creek is also added to the conduit and returned to the Arkansas River from Twin Lakes Dam. The Sugarloaf Powerplant, a privately-operated electrical generation station, runs when water is being conveyed from Sugarloaf Dam to the Mt. Elbert Conduit. All conduit flow which reaches the Mt. Elbert Forebay is used to generate electricity at the Mt. Elbert Power Plant as it is delivered to Twin Lakes.

The Mt. Elbert Powerplant is a pumped-storage facility located on the shore of Twin Lakes. It has two 100-megawatt turbine generators, which can be reversed and used as 340,000-horsepower pumps. In addition to being used to generate energy with the Mt. Elbert Conduit flow, the plant is used to follow daily peak power loads. This load following is accomplished by pumping water to the Mt. Elbert Forebay, an 11,143 af regulating pool at the terminus of the Mt. Elbert Conduit, from Twin Lakes during off-peak load hours using surplus or low-cost energy. That water is then returned to Twin Lakes through the turbines during peak load hours, along with the Mt. Elbert Conduit flow. The energy generated at the plant is transmitted and marketed by the Western Area Power Administration, with the revenues applied to the repayment of the project.

Twin Lakes Dam and Twin Lakes are located on Lake Creek, a tributary of the Arkansas River, about 13 miles south of Leadville, Colorado. Twin Lakes has a surveyed capacity of 140,855 acre-feet at a maximum water surface elevation of 9,200 feet. The morning glory spillway is slightly tilted which reduces the active storage space by 498 acre-feet. During construction, the dead pool (the elevation below which water cannot physically be released) was determined to be 9,157.5 feet msl (54,955 af). In the 1980s, a 24" bypass line used during construction was grouted. At that time, the dead pool was increased to 9,162.8 feet msl (63,324 af). The inactive pool has remained at the same elevation of 9,168.7 feet msl (72,939 af) so there has not been a change in operations.

The reservoir is operated to regulate both project and non-project water imported from the west slope. The project water stored in the reservoir is released to Lake Creek for storage in Pueblo Reservoir during the winter months, in anticipation of spring imports from the west slope. Native inflows into Turquoise Lake, native flows diverted from Halfmoon Creek, and native inflows into Twin Lakes, are all released to Lake Creek from the Twin Lakes Dam. The cities of



Colorado Springs and Aurora take direct delivery of water from the reservoir through their Otero Pipeline. The operation of Twin Lakes also provides for recreation and wildlife habitat.

Pueblo Dam and Reservoir are located on the Arkansas River 6 miles west of the city of Pueblo, Colorado. The reservoir is the terminal storage facility for the Fryingpan-Arkansas Project and has a total storage capacity of 338,374 af at a water surface elevation of 4,898.7 feet. The upper 26,990 af of storage space are reserved exclusively for flood control at all times, while an additional 66,011 af of space are reserved for flood control seasonally from April 15 through November 1. Pueblo Reservoir is also operated to provide for recreation, wildlife habitat, and flood control.

Non-project water may be stored in the reservoir under contract with Reclamation. Native inflow can be stored when the project storage right is in priority or under the winter water storage program (WWSP). Under the WWSP, irrigators are permitted to store native Arkansas River water in Pueblo Reservoir during the winter months for an additional supply of irrigation water, on the condition that the water is used before May 1 of the next water year.

The majority of water deliveries are made from the reservoir. The Fountain Valley Authority, the Pueblo West Metropolitan District, and the Pueblo Board of Water Works can take direct delivery of municipal water through the south outlet works and joint-use manifold. The Southern Delivery System (SDS) in the north outlet works delivers water to the Fountain Valley Authority and Pueblo West. A direct irrigation delivery is made to the Bessemer Ditch. Releases from the fish hatchery outlet at Pueblo Dam support the Pueblo Fish Hatchery. Other project and contract deliveries are made as releases to the Arkansas River for diversion downstream.

Southeastern Colorado Water Conservancy District signed a Lease of Power Privilege contract with the Bureau to construct, operate, maintain and replace a hydroelectric generator below Pueblo Dam. The design will use the existing hydropower bifurcation at the North Outlet Works Southern Delivery System connection. Initial construction began in 2017.

## Hydrologic Conditions and Weather Events in Water Year 2018

Precipitation over the watersheds above Ruedi Reservoir was below average for most of WY2018. Cumulative precipitation started out above average in October but in November it started to level out. Precipitation fell below average from December on. The year finished out in September at 77 percent of average.

Snow pack in the basin followed the general precipitation trend. The SNOTEL sites used to forecast undepleted inflow to Ruedi were at 150 percent of average in November. However, snow pack started to dwindle in December to 83 percent of average and remained in the eighty percent of average range through the remainder of the snow accumulation season. On average, the SNOTEL sites in the forecast group melted out 17 days before the normal melt out date.

The average monthly temperatures measured at the same group of SNOTEL sites were above average for every month of WY2018. October had the closest to average temperature with the average monthly temperature 1.3 degrees Fahrenheit above average. November was the warmest month with the average monthly temperature 8.4 degrees Fahrenheit above average. Autumn averaged 4.5 degrees Fahrenheit above normal; winter 4.4; spring 3.4; summer 3.2 degrees; and the year averaged 3.9 degrees Fahrenheit above average.

The combined Snow Water Equivalent (SWE) compared to average is shown in Figure 1 and monthly precipitation totals are shown in Figure 2. The average monthly temperatures are shown in Figure 3.

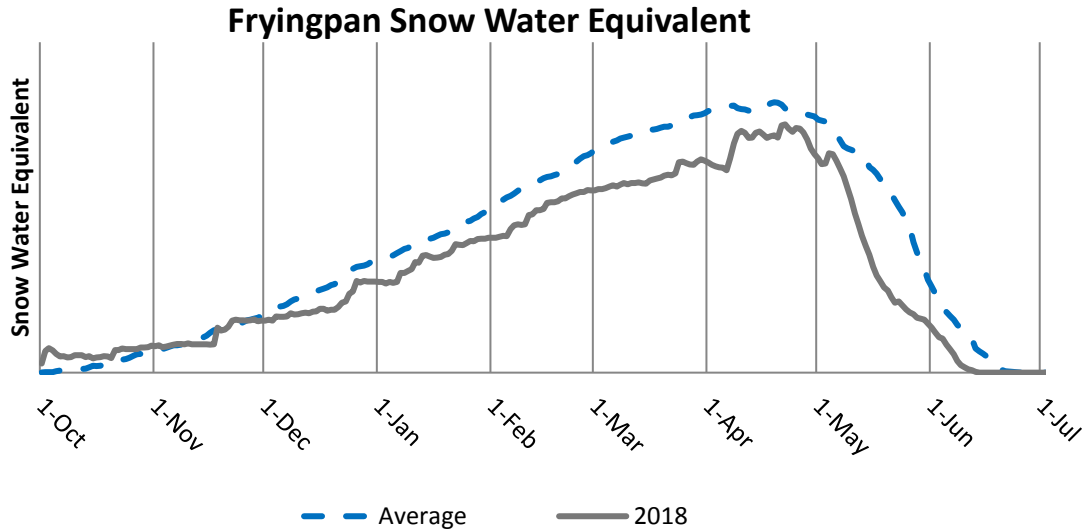


Figure 1: Combined Snow Water Equivalent of Fremont Pass, Independence Pass, Ivanhoe Lake and Nast SNOTEL sites

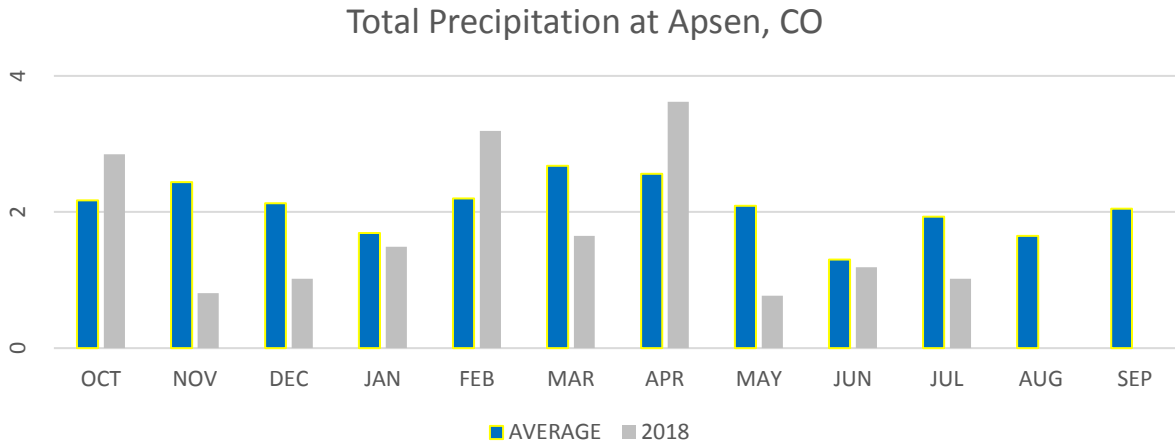


Figure 2: Monthly total precipitation in inches at Aspen, CO

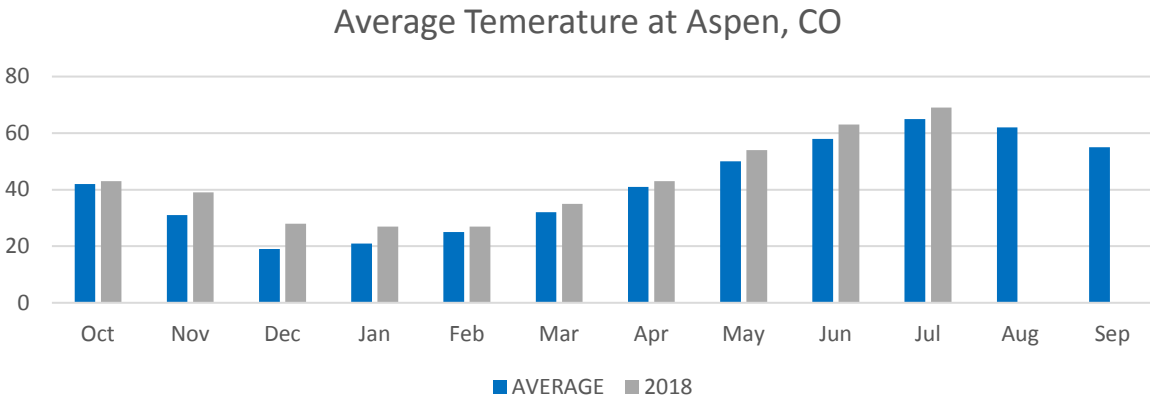


Figure 3: Average Monthly Temperature in degrees F at Aspen CO

Import forecasts were made using the VIPER software package developed for the FryArk Project by the National Weather Service. The forecasts for 2018 were: February 46,200 af; March 38,200 af; April 40,100 af; and May 58,200 af. The total imports in WY 2018 were 39,156 af.

The collection system began diverting April 23. The inflow from the Boustead Tunnel peaked May 26 (see Figure 4).

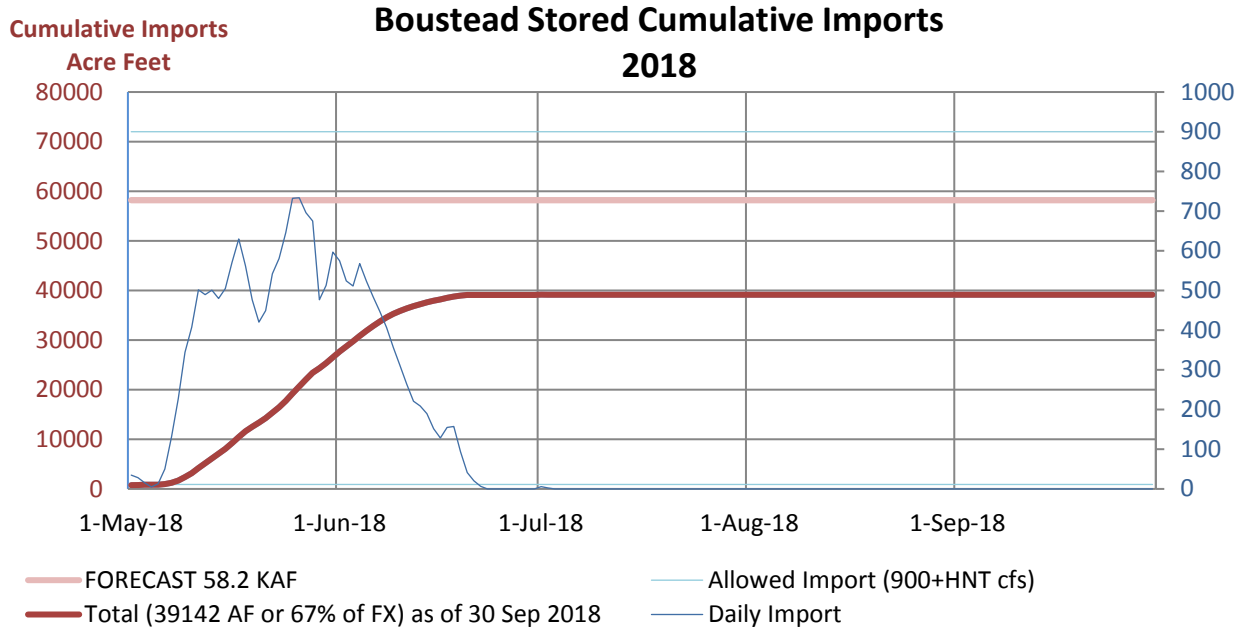


Figure 4: Boustead Tunnel Imports

The flows through the Boustead Tunnel can only be stored when the flow at the Fryingpan River near Thomasville gage is above a minimum flow. When flows are below the minimum, any imports from seepage are considered developed water and treated as native. Water is diverted from the collection system to the Fryingpan to keep the flow above minimum. This year, there wasn't enough flow to divert to keep the flows above minimum for much of the year (Figure 5).



Figure 5: Fryngpan River gage at Thomasville

## Report on Operations during Water Year 2018

### Ruedi Reservoir

Ruedi Reservoir started out WY2018 with a storage content of 80,139 af, which was 91 percent of average. By November the release from Ruedi was decreased to the winter flow target of 85 cfs and was held at this rate until mid-April. The winter releases were made through the city of Aspen's hydroelectric powerplant.

In January the first forecast of undepleted inflow to Ruedi was computed. This forecast indicated that the runoff resulting from snow pack in the basin would be 95 percent of average. This would result in an April through July runoff volume of 134 thousand acre-feet (kaf). Reservoir storage was below average at the beginning of the month and modeling of reservoir futures based on the January undepleted inflow forecast suggested that continuing at our current release of 85 cfs would still fill the reservoir by July, therefore no changes to releases were made in January.

In February the undepleted inflow forecast decreased to 67 percent of average. The predicted undepleted inflow volume was 98 kaf for the April through July period. Reservoir storage was still below average and the release from the reservoir were held at 85 cfs. Modeling of reservoir futures based on the February undepleted inflow forecast indicated that the reservoir would fill by July if we continue at the 85 cfs release. Therefore, no changes were made to the reservoir release that month.

In March the undepleted inflow forecast remained the same at 67 percent of average. The resulting predicted April through July undepleted inflow volume would be 98 kaf. The reservoir storage was very close to average content for the first of the month at 99 percent of average. Modeling of reservoir futures indicated that the reservoir would fill under the most probable assumptions and that there wasn't a significant risk of exceeding the safe channel capacity below the reservoir once the reservoir filled. Therefore, no changes were made to the reservoir release in March.

In April the forecast of undepleted inflow for April through July called for 90 kaf or 64 percent of average. This forecast projected that Ruedi would fill under the most probable case, however, the reasonable minimum scenario did not project Ruedi filling. Since there was no risk of exceeding safe channel flows and the minimum scenario did not project Ruedi filling the release was decreased. After this flow reduction, releases from the reservoir remained constant at about 60 cfs for the remainder of the month and by April 6, the reservoir was drafted down to its lowest annual storage content of 64,575 af.

On April 16th, the yearly conference call took place as required under stipulation 1.7.b of Case Numbers 02CW324 and 02CW365 between the following parties: Reclamation, Southeastern, Division 5, and the River District. A consensus was not reached as to the certainty of Ruedi filling so it was decided to wait one more month and reconvene.

Runoff continued to increase in early May and releases from the reservoir were increased because of the change in the required minimum release to the Fryingpan River. On May 1 the

release was increased from 60 cfs to 110 cfs. The most probable forecast of undepleted inflow predicted 106 kaf or 81 percent of average over the May to July period. The forecast indicated that the reservoir would not fill under the most probable scenario. It also suggested that there would not be enough water to make Coordinated Reservoir Operations (CROS) released for the 15-Mile reach of the Colorado River.

On May 14th, a follow up meeting required under stipulation 1.7.b of Case Numbers 02CW324 and 02CW365 between the following parties: Reclamation, Southeastern, Division 5, and the River District was conducted. Based on the May 1 forecast, provided by Reclamation, it was determined that Ruedi would miss filling by about 2,000 af. As a result, the Boustead Tunnel was limited to 900 cfs of Fryngpan water for the diversion season.

Depleted inflows to Ruedi Reservoir were below average for every month of WY 2018. The total depleted inflow volume for the April through July period was 51,083 af which was 57 percent of average and the fourth lowest for the period of record starting in 1975. Reservoir storage reached a maximum physical content of 92,703 af on June 29. This storage content was 91 percent of the total capacity of the reservoir.

Ruedi Reservoir was in priority and storing inflow from the first of the water year through July 16, and also at the end of the year from October 10 through October 31. Outside this period, Ruedi was required to make contract and replacement releases to the Colorado River. Ruedi released 448 af of water for out of priority diversions through the Boustead Tunnel and 11,609 af for regular contracts.

Included in the total regular contract water released in 2018 were releases made to supplement the Grand Valley irrigator's water supply with unused/unscheduled water. Contract holders in Ruedi pooled their unused/unscheduled water in Ruedi and contributed a total of 9,728 af of which 8,504 af was released between July 30 and October 4.

Beginning on June 28 contracted water was released to support fish recovery efforts in the 15-Mile reach of the Colorado River. These releases are designed to enhance habitat for endangered fish in the Colorado River. A total of 19,495.5 af was released between June 28 and October 18 in WY 2018. This total includes 5,000 af from the firm endangered fish pool, 5,412.5 af from the mitigation water pool, 6,000 af of Ute rental water, and 3,083 af from the 4-out-of-5 fish pool. The 4-out-of-5 fish pool was not initially made available to the Fish and Wildlife Service because the reservoir failed to physical fill, however, the Exxon Mobil Corporation contributed 5,000 af of their unused/unscheduled water to be used for this purpose.

Ruedi ended the water year at a water surface elevation of 7,717.20 feet which equates to 60,831 af of storage. That volume was 74 percent of average for October 31.

### **West Slope Collection System and Project Diversions**

The most probable forecasts for the first of February, March, April, and May were 46,200 af, 38,200 af, 40,100 af, and 58,200 af, respectively. There was a significant decrease in precipitation along with warm temperatures leading to early snowmelt in May. A total of 40,897 af of the water diverted through the Boustead Tunnel and 39,156 af of water was stored

during the WY2018, which is 70 percent of average for the period from WY1972 to WY2018 and 67 percent of the May 2018 forecast.

The import of project water through the Boustead Tunnel began on April 23. The maximum mean daily import through Boustead Tunnel was 743 cfs on May 26, 2018. A portion of the diversion system was shut down in late July and the rest during late August. Boustead Tunnel seepage was recorded whenever the Fry-Ark Project water rights were in priority. There was no Busk-Ivanhoe water conveyed through the Boustead Tunnel. The daily discharge record for the diversion structures is included as Appendix D. An aggregated discharge record is shown on Table 4. The 47 years of accumulated imports total 2,459 kaf, for an unimpeded average of 55,250 af per year, is shown on Table 5. A plot of the Boustead Tunnel imports during WY2018 is shown on Figure 4 and a table is shown Exhibit 5.

Ruedi Reservoir was not forecast to fill this year. In accordance with stipulations to 02CW324 and 02CW354 and the November 30, 2004 agreement between the Southeastern Colorado Water Conservancy District, Colorado River Water Conservation District and the Twin Lakes Reservoir Canal Company, imports through the Boustead Tunnel were constrained to a maximum of 900 cfs plus one half of the minimum flow through the Hunter diversions.

### **Twin Lakes Reservoir and Canal Company/Fryingpan-Arkansas Project Exchange**

The Bureau of Reclamation is obligated to maintain minimum stream flows in the Roaring Fork River by the authorizing legislation of the project. This is accomplished through an exchange of water with the Twin Lakes Reservoir and Canal Company (TLCC). On 1 October 2017, the company began bypassing water into the Roaring Fork River on the west slope in exchange for project water stored in Twin Lakes on the east slope.

Twin Lakes Canal Company (TLCC) began the year with 40,070 AF in storage at Twin Lakes. They reached their maximum storage of 48,329 AF on June 21. Repairs on Grizzly Reservoir meant the water for the exchange was released from Lost Man between November 1 to 12. Between May 21 and June 18, the TLCC exchange ceased so the water could be released at higher flows later in the season. On June 18, it was determined that, since Midway and No Name diversions had passed more than 3,000 AF, TLCC would exchange 4 cfs on Roaring Fork and 21 cfs on Lincoln Creek, more than the normal monthly average to try to capture the full 3,000 AF in Twin Lakes. On July 3, the release down Lincoln Creek was increased to 35 cfs. On July 19, the 3,000 AF exchange limit was met.

The total amount of the TLCC exchange was 3,018 af with a net credit to TLCC of 3,000 af. The operating criteria and the monthly summary of the exchange are shown in Appendix C.

### **Turquoise Lake**

On September 30, 2017, there was 115,852 af of water (elevation of 9,861.17, feet) stored in Turquoise Lake, 104 percent of average. The high point for storage was 116,540 af of water (elevation 9,862.16 feet) on October 12. Releases made down Lake Fork Creek and to Twin Lakes drafted Turquoise Lake to 73,387 af (9,835.59 feet), the lowest storage of the water year, on April 18. At the end of the water year on 30 September 2018 there was 99,960 af, an elevation

9852.33 feet, which is 90 percent of average. Exhibits 8 and 9 show the precipitation and pan evaporation at Turquoise Lake. Table 6 and Exhibit 10 depict the monthly operation of Turquoise Lake during WY2018.

There was 20,291 af imported through Homestake Tunnel to the account in Turquoise Reservoir.

Busk-Ivanhoe imports through the Carlton Tunnel stored totaled 1,462 af. Pueblo Water (formerly Board of Water Works Pueblo) received the entire amount.

Project water imports through the Boustead Tunnel totaled 39,152 af.

Exhibits 5, 6, and 7 show the monthly imports through the Boustead, Homestake, and Busk-Ivanhoe Tunnels, respectively.

### **Mt. Elbert Conduit/Halfmoon Creek Diversion**

During WY2018, 79,716 af of water was released from Turquoise Lake through the Sugarloaf Powerplant; 10,054 af of water was bypassed around the powerplant; and 5,018 af of water was diverted from Halfmoon Creek and was conveyed through the Mt. Elbert Conduit to the Mt. Elbert Forebay, and subsequently to Twin Lakes through the Mt. Elbert Power Plant. An additional 3,909 af of water were released into the conduit from Turquoise Lake for use by the Leadville Federal Fish Hatchery. The water was diverted from the conduit and delivered to the hatchery. It was then returned to the Arkansas River and stored in Pueblo Reservoir. The conduit operations are shown on Exhibit 11.

### **Twin Lakes/Mt. Elbert Forebay and Mt. Elbert Pumped-Storage Power Plant**

On September 30, 2017, Twin Lakes had 121,850 af of water stored (elevation 9,192.71 feet) and Mt. Elbert Forebay had 8,528 af in storage (elevation 9,635.85 feet). The Twin Lakes/Mt. Elbert Forebay combined water storage reached a low point of 100,548 af on August 31 and was at its highest storage volume of 137,030 af on June 19. The storage in Twin Lakes was 97,407 af and in Mt. Elbert Forebay was 8,638 af of water (Twin Lakes elevation 9,181.74 feet and Mt. Elbert Forebay elevation 9,636.28 feet) on September 30, 2018, which was 85 percent of average.

Twin Lakes releases to Lake Creek were made throughout the winter to pass the flow of the Mt. Elbert Conduit, and to transfer project water stored in Twin Lakes to Pueblo Reservoir. The native inflow of 3,158 af was stored in the Twin Lakes Canal Company (TLCC) storage space from 15 November through 15 March as winter water storage. A total of 10,921 af of project water was released to Lake Creek during this time.

Exhibits 12 and 13 show the precipitation and pan evaporation at Turquoise Lake. Table 7 and Exhibit 14 depict the monthly operation of Twin Lakes during WY2018.

A total of 10,000 af of Fry-Ark Project water was made available at the beginning of the season to the Upper Arkansas Voluntary Flow Management Program (VFMP) to augment flows at the gage Arkansas River at Wellsville. At the request of Colorado Parks and Wildlife, an additional 3,100 af of project water was released in August. While the Bureau of Reclamation is not a party



to the agreement between Southeastern Colorado Water Conservancy District; Colorado Parks and Wildlife; Chafee County; the Arkansas River Outfitters Association; and Trout Unlimited, project water is made available when possible to support this agreement. Water may be called for year-round to support fishery flows at 250 cfs. Recreational flows may be provided from July 1 to August 15 if the flow at Wellsville is below 700 cfs. This year, flows were maintained well under 700 cfs to allow rafting to continue throughout the entire time frame. The flows may be ramped down to prevent streambank erosion after August 15.

A total of 276,442 megawatt hours of energy was generated at the power plant, with 810,215 af of water; 89,999 af came through the Mt. Elbert Conduit; and 728,585 af were first pumped to the Mt. Elbert Forebay from Twin Lakes during off-peak electric demand hours. Table 8 depicts the monthly power plant operation for WY2018.

### **Pueblo Reservoir**

The water storage content of Pueblo Reservoir was 203,784 af (elevation 4,870.34 feet) on September 30, 2017. The reservoir reached a high point in storage of 276,652 af (elevation 4,887.04 feet) on March 2 and a low point on September 30. At the end of the water year on September 30, 2018 there was 189,469 af, an elevation 4,866.53 feet, which is 140 percent of average.

A total of 60,637 af of native inflow was stored in the reservoir under the Pueblo Reservoir winter water storage program between November 15, 2017 and March 14, 2018. This program allows agricultural entities to store native flows during the winter to be used during irrigation season. On March 15, it was distributed to agricultural entities.

Pueblo Reservoir storage was 258,434 af on April 1. The Corps of Engineers (COE) requires the joint use pool be evacuated by April 15 and the reservoir drawn down to 245,373 af. In the past, COE issued waivers to allow accounts to encroach into the joint use pool until May 1, the day all winter water carryover must be out of the reservoir and any remaining project carryover will revert to the project. Changes in guidance from COE mean waivers will no longer be issued as in the past. This makes it much more likely that a spill, the forced evacuation of account water, will occur in mid-April in the future. In WY2018, account holders cooperated to draw down their accounts, even when the timing of releases was not optimal for an individual account holder, releasing water before the April 15 deadline. Water was moved to other vessels, including John Martin and Great Plains Reservoir, or used early for irrigation.

Table 9 and Exhibit 19 depict Pueblo Reservoir monthly operations during the 2018 water year. The 2016-2018 winter water storage is shown on Exhibit 16, and the winter water releases are shown on Exhibit 17. The precipitation and evaporation at the reservoir are shown on Exhibits 15 and 18. Project water releases are shown on Exhibit 20.

### **Storage Contracts**

There were four long term storage contracts for a total of 57,416 af of non-project storage in Turquoise Lake, one for 54,452 af in Twin Lakes and six for 53,112.5 af in Pueblo Reservoir.

Ten contracts totaling 8,889 af were interim, one-year contracts for "if-and-when" storage space in Pueblo Reservoir. Sixteen contracts totaling 2,205 af under the Master Contract were used for "if-and-when" storage. Under "if and when" contracts, non-project water may be stored in project storage space as long as that storage space is not required for project water.

### **Project Water Sales and Deliveries**

There was 41,283 af of Fryingpan-Arkansas Project water made available to the Southeastern Colorado Water Conservancy District (SECWCD) during WY2018 for allocation based on an expected import of 58,200 af. SECWCD allocates 80 percent of the forecast project yield in May. This year, the precipitation was so low in May that SECWCD decided to reduce the initial allocation to 24,195 af. On July 1, they made a second allocation of the remaining yield. Municipal and industrial accounts received a total of 9,326 af and agricultural accounts received 18,273 af. Entities called for 25,365 af of project and 4,090 project carryover water during the year.

Evaporation reduced the project carryover water in storage by 9,649 af. By the end of the water year (September 30, 2018), the District had 10,380 af of 2018 allocated water and 121,455 af of carryover water remaining in storage. The monthly release of project water from Pueblo Reservoir is shown on Exhibit 21.

### **Reservoir Storage Allocation Data**

Table 10 presents the reservoir storage allocations for the five project reservoirs.

### **Reservoir Evaporation and Precipitation**

Tables 12 and 13 present the monthly average evaporation and precipitation at the four weather stations near project facilities. When an evaporation pan is not in service and a reservoir is not completely ice-covered, the daily water surface evaporation is computed using seasonal evaporation factors. Those factors are listed in Table 11. The assumption is that there is no evaporation from a reservoir water surface when ice completely covers the reservoir.

### **Flood Control Benefits**

The Army Corps of Engineers estimated that the operations at Ruedi Reservoir during WY2018 prevented no flood damages. Since impoundment, Ruedi Reservoir has prevented a total of \$19,718,700 (unadjusted for inflation) in potential flood damages.

The Army Corps of Engineers estimated that the operations at Pueblo Reservoir prevented no flood damages during WY2018. Since impoundment, Pueblo Reservoir has prevented a total of \$36,785,000 (unadjusted for inflation) in potential flood damages.

Appendix A, Table 14 shows the historic flood control benefits provided by Pueblo and Ruedi Dams.

# Appendix A: Tables

## 1. Ruedi Reservoir Operations WY2018

Fryingpan-Arkansas Project  
Unit: 1,000 AF

Month	Inflow	Evaporation	Outflow	End of Month Content	Water Surface Elevation (msl)
OCT 17	4.23	0.08	7.83	76.74	7,737.88
NOV 17	3.11	0.00	5.00	74.79	7,735.51
DEC 17	2.42	0.00	4.92	72.12	7,732.19
JAN 18	2.52	0.00	5.20	69.45	7,728.79
FEB 18	2.43	0.00	4.74	67.13	7,725.77
MAR 18	2.95	0.00	5.30	64.77	7,722.62
APR 18	7.01	0.00	4.39	67.39	7,726.11
MAY 18	20.14	0.22	6.13	81.18	7,743.14
JUN 18	18.19	0.57	6.13	92.67	7,755.96
JUL 18	6.20	0.54	10.39	87.95	7,750.81
AUG 18	3.12	0.37	11.64	70.06	7,740.65
SEP 18	1.98	0.20	16.22	64.62	7,722.41
<b>Total* (acre-feet)</b>	74,293	1,972	87,888		

\*Rounding may introduce discrepancies between monthly and yearly totals

## 2. Ruedi Reservoir Releases for Contracts WY2018

Fryingpan-Arkansas Project  
Unit: AF

Month	Round 1	Round 2 Nonfish	Round 2 Fish
OCT 2017			
NOV 2017			
DEC 2017			
JAN 2018			
FEB 2018			
MAR 2018			
APR 2018			
MAY 2018			
JUN 2018			277
JUL 2018	154	690	3,510
AUG 2018	358	4,621	3,332
SEP 2018	245	4,685	8,450
OCT 2018	52	805	3,927
<b>Total</b>	<b>808</b>	<b>10,801</b>	<b>19,496</b>

### 3. Ruedi Reservoir Releases for Endangered Fish WY2018

FRYINGPAN-ARKANSAS PROJECT  
 RUEDI RESERVOIR  
 RELEASES FOR ENDANGERED FISH  
 WATER YEAR 2018  
 April

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN RIVER GAGE BELOW DAM (CFS)	RUEDI CALLED OUT? (Y= YES) (N= NO)	REQUIRED MIN FLOW BELOW RUEDI w/o FISH REL (CFS)	REQUIRED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
SUN	4/1/2018	7,722.55	64,723	61	0	87	2	89	N	39	0	0	1,166
MON	4/2/2018	7,722.51	64,693	72	0	87	3	90	N	39	0	0	1,024
TUE	4/3/2018	7,722.47	64,664	72	0	87	3	89	N	39	0	0	934
WED	4/4/2018	7,722.42	64,627	68	0	87	2	89	N	39	0	0	952
THU	4/5/2018	7,722.36	64,582	64	0	87	2	89	N	39	0	0	830
FRI	4/6/2018	7,722.35	64,575	83	0	87	3	90	N	39	0	0	673
SAT	4/7/2018	7,722.44	64,642	121	0	87	3	91	N	39	0	0	568
SUN	4/8/2018	7,722.63	64,782	159	0	89	5	94	N	39	0	0	1,222
MON	4/9/2018	7,722.69	64,827	110	0	87	4	92	N	39	0	0	1,757
TUE	4/10/2018	7,722.72	64,849	99	0	87	4	91	N	39	0	0	1,399
WED	4/11/2018	7,722.78	64,893	110	0	88	3	91	N	39	0	0	1,191
THU	4/12/2018	7,722.88	64,967	125	0	87	4	91	N	39	0	0	988
FRI	4/13/2018	7,722.95	65,020	114	0	87	4	91	N	39	0	0	842
SAT	4/14/2018	7,722.97	65,034	95	0	87	4	91	N	39	0	0	875
SUN	4/15/2018	7,722.98	65,042	91	0	87	4	91	N	39	0	0	891
MON	4/16/2018	7,722.99	65,049	91	0	87	4	91	N	39	0	0	756
TUE	4/17/2018	7,723.07	65,108	92	0	63	4	66	N	39	0	0	632
WED	4/18/2018	7,723.15	65,168	84	0	54	4	58	N	39	0	0	619
THU	4/19/2018	7,723.23	65,227	85	0	55	4	58	N	39	0	0	665
FRI	4/20/2018	7,723.40	65,354	118	0	55	4	58	N	39	0	0	575
SAT	4/21/2018	7,723.51	65,436	96	0	54	4	58	N	39	0	0	804
SUN	4/22/2018	7,723.61	65,510	92	0	55	4	58	N	39	0	0	737
MON	4/23/2018	7,723.78	65,637	121	0	57	4	61	N	39	0	0	582
TUE	4/24/2018	7,724.01	65,809	148	0	62	4	66	N	39	0	0	485
WED	4/25/2018	7,724.23	65,973	145	0	62	4	66	N	39	0	0	691
THU	4/26/2018	7,724.50	66,176	163	0	62	4	66	N	39	0	0	870
FRI	4/27/2018	7,724.83	66,423	186	0	61	4	66	N	39	0	0	964
SAT	4/28/2018	7,725.23	66,724	213	0	61	4	66	N	39	0	0	1,024
SUN	4/29/2018	7,725.66	67,049	225	0	61	5	66	N	39	0	0	1,265
MON	4/30/2018	7,726.11	67,389	233	0	61	5	67	N	39	0	0	1,728
Averages		7,723.37	65,332	118	0	74	4	78		39	0		924
Totals (acft)				7,017	0	4,402	218	4,620		2,321	0	0	54,960

NOTES: Releases of water to support 15-Mile Reach target started 6/28 and ceased 10/18. A total of 19,496 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT  
 RUEDI RESERVOIR  
 RELEASES FOR ENDANGERED FISH  
 WATER YEAR 2018  
 May

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN	RUEDI	REQUIRED	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
								RIVER GAGE BELOW DAM (CFS)	CALLED OUT? (Y= YES) (N= NO)	MIN FLOW BELOW RUEDI w/o FISH REL (CFS)			
TUE	5/1/2018	7,726.43	67,633	225	3	99	6	105	N	110	0	0	2,065
WED	5/2/2018	7,726.83	67,938	264	3	107	7	114	N	110	0	0	1,888
THU	5/3/2018	7,727.20	68,221	253	3	107	7	115	N	110	0	0	1,701
FRI	5/4/2018	7,727.48	68,435	219	3	108	8	116	N	110	0	0	1,591
SAT	5/5/2018	7,727.79	68,673	232	3	108	8	116	N	110	0	0	1,310
SUN	5/6/2018	7,728.16	68,958	255	3	108	8	116	N	110	0	0	1,296
MON	5/7/2018	7,728.55	69,260	263	3	108	8	116	N	110	0	0	1,588
TUE	5/8/2018	7,729.01	69,616	292	3	109	8	116	N	110	0	0	2,144
WED	5/9/2018	7,729.62	70,092	352	3	109	8	117	N	110	0	0	3,075
THU	5/10/2018	7,730.22	70,561	350	3	110	10	120	N	110	0	0	4,071
FRI	5/11/2018	7,730.99	71,167	419	3	110	13	123	N	110	0	0	4,708
SAT	5/12/2018	7,731.71	71,736	402	3	111	16	127	N	110	0	0	5,417
SUN	5/13/2018	7,732.38	72,269	383	3	111	17	128	N	110	0	0	5,733
MON	5/14/2018	7,732.99	72,757	357	3	108	17	125	N	110	0	0	5,779
TUE	5/15/2018	7,733.58	73,230	336	3	93	17	110	N	110	0	0	5,508
WED	5/16/2018	7,734.22	73,746	359	3	95	17	112	N	110	0	0	5,220
THU	5/17/2018	7,734.94	74,330	393	4	95	17	113	N	110	0	0	5,381
FRI	5/18/2018	7,735.65	74,908	390	4	95	19	114	N	110	0	0	5,696
SAT	5/19/2018	7,736.25	75,399	347	4	96	20	115	N	110	0	0	5,517
SUN	5/20/2018	7,736.82	75,867	335	4	96	19	115	N	110	0	0	5,032
MON	5/21/2018	7,737.38	76,329	331	4	95	18	113	N	110	0	0	4,648
TUE	5/22/2018	7,737.96	76,809	337	4	91	17	108	N	110	0	0	4,503
WED	5/23/2018	7,738.53	77,283	334	4	91	18	109	N	110	0	0	4,711
THU	5/24/2018	7,739.09	77,750	331	4	92	19	111	N	110	0	0	4,879
FRI	5/25/2018	7,739.70	78,262	353	4	92	20	112	N	110	0	0	4,957
SAT	5/26/2018	7,740.43	78,876	405	4	92	21	113	N	110	0	0	5,438
SUN	5/27/2018	7,741.00	79,358	339	4	92	21	113	N	110	0	0	5,614
MON	5/28/2018	7,741.58	79,850	343	4	91	21	112	N	110	0	0	5,171
TUE	5/29/2018	7,742.10	80,293	317	4	90	21	111	N	110	0	0	5,053
WED	5/30/2018	7,742.61	80,729	314	4	90	20	110	N	110	0	0	4,342
THU	5/31/2018	7,743.14	81,184	323	4	90	18	108	N	110	0	0	3,976
Averages		7,734.33	73,920	328	3	100	15	115		110	0		4,130
Totals (acft)				20,139	215	6,130	921	7,051		6,764	0	0	253,918

NOTES: Releases of water to support 15-Mile Reach target started 6/28 and ceased 10/18. A total of 19,496 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT  
 RUEDI RESERVOIR  
 RELEASES FOR ENDANGERED FISH  
 WATER YEAR 2018  
 June

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN	RUEDI	REQUIRED	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
								RIVER GAGE BELOW DAM (CFS)	CALLED OUT? (Y= YES) (N= NO)	MIN FLOW BELOW RUEDI w/o FISH REL (CFS)			
FRI	6/1/2018	7,743.76	81,718	373	9	94	18	112	N	110	0	0	4,330
SAT	6/2/2018	7,744.40	82,272	384	9	96	17	113	N	110	0	0	4,624
SUN	6/3/2018	7,745.03	82,819	381	9	96	17	113	N	110	0	0	4,450
MON	6/4/2018	7,745.78	83,474	436	9	96	16	112	N	110	0	0	4,355
TUE	6/5/2018	7,746.49	84,097	420	9	97	16	112	N	110	0	0	4,371
WED	6/6/2018	7,747.12	84,652	386	9	97	15	112	N	110	0	0	4,323
THU	6/7/2018	7,747.68	85,147	356	9	97	15	112	N	110	0	0	3,827
FRI	6/8/2018	7,748.21	85,617	344	9	98	14	112	N	110	0	0	3,350
SAT	6/9/2018	7,748.77	86,116	359	9	98	13	111	N	110	0	0	3,042
SUN	6/10/2018	7,749.30	86,589	346	9	98	12	110	N	110	0	0	2,871
MON	6/11/2018	7,749.82	87,054	336	10	91	12	103	N	110	0	0	2,755
TUE	6/12/2018	7,750.29	87,477	316	10	93	11	104	N	110	0	0	2,462
WED	6/13/2018	7,750.76	87,900	316	10	93	10	103	N	110	0	0	2,065
THU	6/14/2018	7,751.21	88,307	315	10	100	10	110	N	110	0	0	1,876
FRI	6/15/2018	7,751.66	88,715	317	10	101	9	110	N	110	0	0	1,787
SAT	6/16/2018	7,752.10	89,115	313	10	102	8	110	N	110	0	0	1,665
SUN	6/17/2018	7,752.66	89,626	369	10	102	8	110	N	110	0	0	1,772
MON	6/18/2018	7,753.21	90,129	365	10	102	8	110	N	110	0	0	2,409
TUE	6/19/2018	7,753.63	90,515	306	10	102	9	112	N	110	0	0	2,809
WED	6/20/2018	7,754.03	90,883	298	10	103	9	112	N	110	0	0	2,445
THU	6/21/2018	7,754.40	91,225	284	10	102	8	110	N	110	0	0	1,894
FRI	6/22/2018	7,754.74	91,540	271	10	102	7	110	N	110	0	0	1,567
SAT	6/23/2018	7,755.03	91,809	247	10	102	7	109	N	110	0	0	1,381
SUN	6/24/2018	7,755.26	92,022	219	10	102	7	108	N	110	0	0	1,203
MON	6/25/2018	7,755.47	92,218	211	10	102	6	108	N	110	0	0	921
TUE	6/26/2018	7,755.66	92,395	203	10	104	6	110	N	110	0	0	719
WED	6/27/2018	7,755.83	92,554	194	10	104	6	110	N	110	0	0	677
THU	6/28/2018	7,755.97	92,684	180	10	104	5	109	N	110	40	79	573
FRI	6/29/2018	7,755.99	92,703	160	10	141	5	146	N	110	50	178	494
SAT	6/30/2018	7,755.96	92,675	146	10	150	5	155	N	110	50	277	426
Averages		7,751.34	88,468	305	10	102	10	113		110	5		2,381
Totals (acft)				18,148	572	6,085	615	6,700		6,546	277	277	141,709

NOTES: Releases of water to support 15-Mile Reach target started 6/28 and ceased 10/18. A total of 19,496 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT  
 RUEDI RESERVOIR  
 RELEASES FOR ENDANGERED FISH  
 WATER YEAR 2018  
 July

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN RIVER GAGE BELOW DAM (CFS)	RUEDI CALLED OUT? (Y= YES) (N= NO)	REQUIRED MIN FLOW BELOW RUEDI w/o FISH REL (CFS)	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
SUN	7/1/2018	7,755.93	92,647	145	9	150	5	154	N	110	50	376	405
MON	7/2/2018	7,755.81	92,535	134	9	182	4	186	N	110	88	550	348
TUE	7/3/2018	7,755.65	92,385	125	9	192	4	196	N	110	100	748	339
WED	7/4/2018	7,755.49	92,237	125	9	191	4	195	N	110	100	946	311
THU	7/5/2018	7,755.32	92,078	120	9	191	4	195	N	110	100	1145	323
FRI	7/6/2018	7,755.15	91,920	121	9	191	3	195	N	110	100	1343	385
SAT	7/7/2018	7,754.98	91,762	120	9	191	3	194	N	110	100	1541	416
SUN	7/8/2018	7,754.82	91,614	125	9	191	3	194	N	110	100	1740	457
MON	7/9/2018	7,754.65	91,456	120	9	191	3	194	N	110	100	1938	453
TUE	7/10/2018	7,754.44	91,262	101	9	190	3	193	N	104	100	2136	429
WED	7/11/2018	7,754.26	91,096	119	9	194	3	197	N	110	100	2335	392
THU	7/12/2018	7,754.03	90,883	92	9	190	3	193	N	95	100	2533	355
FRI	7/13/2018	7,753.83	90,699	106	9	190	3	193	N	109	100	2731	370
SAT	7/14/2018	7,753.60	90,488	92	9	190	3	193	N	95	100	2930	340
SUN	7/15/2018	7,753.36	90,267	88	9	190	3	193	N	90	100	3128	417
MON	7/16/2018	7,753.16	90,084	107	9	190	3	193	N	109	100	3326	423
TUE	7/17/2018	7,753.00	89,937	85	9	151	3	153	Y	88	43	3411	360
WED	7/18/2018	7,752.87	89,818	82	9	133	3	136	Y	85	27	3464	340
THU	7/19/2018	7,752.80	89,754	88	9	111	3	114	Y	90	0	3464	412
FRI	7/20/2018	7,752.70	89,663	75	9	112	2	115	Y	78	0	3464	353
SAT	7/21/2018	7,752.61	89,580	84	9	117	2	120	Y	87	0	3464	344
SUN	7/22/2018	7,752.49	89,471	71	9	117	2	119	Y	73	0	3464	294
MON	7/23/2018	7,752.38	89,370	75	9	117	2	119	Y	77	0	3464	499
TUE	7/24/2018	7,752.28	89,279	79	9	117	2	119	Y	81	0	3464	499
WED	7/25/2018	7,752.16	89,170	70	9	116	2	118	Y	72	0	3464	541
THU	7/26/2018	7,752.04	89,060	70	9	116	2	118	Y	72	0	3464	525
FRI	7/27/2018	7,751.87	88,906	60	9	129	2	132	Y	62	13	3489	505
SAT	7/28/2018	7,751.65	88,706	72	9	165	2	167	Y	75	50	3588	530
SUN	7/29/2018	7,751.38	88,461	53	9	168	2	170	Y	56	50	3687	578
MON	7/30/2018	7,751.12	88,226	58	9	168	2	170	Y	61	25	3737	632
TUE	7/31/2018	7,750.81	87,945	57	9	190	2	192	Y	59	25	3787	570
Averages		7,753.44	90,347	94	9	162	3	165		91	57		424
Totals (acft)				5,790	539	9,981	176	10,157		5,589	3510	3787	26,073

NOTES: Releases of water to support 15-Mile Reach target started 6/28 and ceased 10/18. A total of 19,496 acre-feet was released to support Recovery Program target flows.



FRYINGPAN-ARKANSAS PROJECT  
 RUEDI RESERVOIR  
 RELEASES FOR ENDANGERED FISH  
 WATER YEAR 2018  
 August

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN RIVER GAGE BELOW DAM (CFS)	RUEDI CALLED OUT? (Y= YES) (N= NO)	REQUIRED MIN FLOW BELOW RUEDI w/o FISH REL (CFS)	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
WED	8/1/2018	7,750.47	87,639	49	6	197	2	199	Y	51	25	3836	527
THU	8/2/2018	7,750.14	87,342	53	6	197	2	199	Y	56	25	3886	444
FRI	8/3/2018	7,749.83	87,063	63	6	197	2	199	Y	65	50	3985	383
SAT	8/4/2018	7,749.53	86,794	67	6	197	2	199	Y	69	50	4084	609
SUN	8/5/2018	7,749.21	86,508	59	6	197	2	199	Y	61	50	4183	693
MON	8/6/2018	7,748.89	86,223	59	6	197	2	199	Y	61	50	4283	717
TUE	8/7/2018	7,748.53	85,902	41	6	197	2	199	Y	43	50	4382	657
WED	8/8/2018	7,748.20	85,609	55	6	197	2	199	Y	57	50	4481	595
THU	8/9/2018	7,747.85	85,298	46	6	197	2	199	Y	48	50	4580	557
FRI	8/10/2018	7,747.50	84,988	47	6	197	2	199	Y	49	50	4679	542
SAT	8/11/2018	7,747.14	84,670	42	6	197	2	199	Y	45	50	4778	537
SUN	8/12/2018	7,746.79	84,361	47	6	197	2	199	Y	49	50	4878	554
MON	8/13/2018	7,746.40	84,018	30	6	197	2	199	Y	32	50	4977	510
TUE	8/14/2018	7,746.03	83,693	39	6	197	2	199	Y	41	50	5076	500
WED	8/15/2018	7,745.66	83,370	40	6	197	2	199	Y	42	50	5175	482
THU	8/16/2018	7,745.30	83,055	44	6	197	2	199	Y	46	50	5274	439
FRI	8/17/2018	7,744.94	82,741	44	6	196	2	198	Y	46	50	5373	405
SAT	8/18/2018	7,744.62	82,463	62	6	196	2	198	Y	64	50	5473	533
SUN	8/19/2018	7,744.26	82,150	44	6	196	2	198	Y	46	50	5572	558
MON	8/20/2018	7,743.92	81,856	45	6	187	2	189	Y	47	65	5701	533
TUE	8/21/2018	7,743.65	81,623	67	6	179	2	181	Y	69	65	5830	590
WED	8/22/2018	7,743.40	81,407	74	6	177	2	179	Y	76	65	5959	883
THU	8/23/2018	7,743.14	81,184	70	6	177	2	179	Y	72	65	6088	1,097
FRI	8/24/2018	7,742.87	80,952	66	6	177	2	179	Y	68	65	6216	1,050
SAT	8/25/2018	7,742.58	80,703	58	6	177	2	179	Y	60	65	6345	1,032
SUN	8/26/2018	7,742.27	80,438	49	6	177	2	179	Y	51	65	6474	900
MON	8/27/2018	7,741.95	80,165	45	6	177	2	179	Y	47	65	6603	818
TUE	8/28/2018	7,741.63	79,892	45	6	177	2	179	Y	47	65	6732	785
WED	8/29/2018	7,741.31	79,620	45	6	176	2	178	Y	47	65	6861	703
THU	8/30/2018	7,741.00	79,358	50	6	176	2	178	Y	52	65	6990	648
FRI	8/31/2018	7,740.65	79,061	33	6	176	2	178	Y	35	65	7119	615
Averages		7,745.47	83,231	51	6	189	2	191		53	54		642
Totals (acft)				3,132	368	11,648	125	11,773		3,257	3,332	7,119	39,466

NOTES: Releases of water to support 15-Mile Reach target started 6/28 and ceased 10/18. A total of 19,496 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT  
 RUEDI RESERVOIR  
 RELEASES FOR ENDANGERED FISH  
 WATER YEAR 2018  
 September

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN RIVER GAGE BELOW DAM (CFS)	RUEDI CALLED OUT? (Y= YES) (N= NO)	REQUIRED MIN FLOW BELOW RUEDI w/o FISH REL (CFS)	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
SAT	9/1/2018	7,740.32	78,783	40	4	177	2	179	Y	42	65	7,248	592
SUN	9/2/2018	7,739.99	78,505	40	4	176	2	178	Y	42	119	7,484	519
MON	9/3/2018	7,739.66	78,228	40	4	176	2	178	Y	42	119	7,720	387
TUE	9/4/2018	7,739.25	77,884	42	3	212	2	214	Y	44	152	8,021	368
WED	9/5/2018	7,738.81	77,517	41	3	223	2	225	Y	43	160	8,339	361
THU	9/6/2018	7,738.36	77,142	37	3	223	2	225	Y	39	160	8,656	438
FRI	9/7/2018	7,737.93	76,785	46	3	223	2	225	Y	48	160	8,974	455
SAT	9/8/2018	7,737.46	76,395	30	3	223	2	225	Y	32	160	9,291	399
SUN	9/9/2018	7,737.01	76,024	39	3	223	2	225	Y	41	160	9,608	333
MON	9/10/2018	7,736.55	75,645	36	3	223	2	225	Y	37	160	9,926	301
TUE	9/11/2018	7,736.05	75,235	30	3	234	2	235	Y	32	175	10,273	268
WED	9/12/2018	7,735.54	74,818	32	3	239	2	241	Y	34	175	10,620	260
THU	9/13/2018	7,735.01	74,386	24	3	239	2	240	Y	26	175	10,967	199
FRI	9/14/2018	7,734.38	73,876	33	3	288	2	289	Y	35	175	11,314	192
SAT	9/15/2018	7,733.69	73,319	30	3	308	2	309	Y	32	175	11,661	190
SUN	9/16/2018	7,732.99	72,757	28	3	308	2	310	Y	30	175	12,008	220
MON	9/17/2018	7,732.30	72,205	32	3	307	2	309	Y	34	175	12,355	227
TUE	9/18/2018	7,731.52	71,586	28	3	337	2	339	Y	30	175	12,702	212
WED	9/19/2018	7,730.72	70,954	36	3	351	2	353	Y	38	135	12,970	210
THU	9/20/2018	7,729.91	70,318	34	3	351	2	353	Y	35	135	13,238	219
FRI	9/21/2018	7,729.10	69,686	34	3	349	2	351	Y	36	135	13,506	229
SAT	9/22/2018	7,728.27	69,043	29	3	350	2	351	Y	30	135	13,774	220
SUN	9/23/2018	7,727.45	68,412	34	3	349	2	351	Y	36	135	14,041	164
MON	9/24/2018	7,726.72	67,854	34	3	312	2	314	Y	35	110	14,260	137
TUE	9/25/2018	7,726.00	67,306	25	3	298	2	299	Y	26	110	14,478	147
WED	9/26/2018	7,725.29	66,769	29	3	297	2	298	Y	31	110	14,696	139
THU	9/27/2018	7,724.57	66,228	27	3	297	2	299	Y	29	110	14,914	158
FRI	9/28/2018	7,723.85	65,689	29	3	297	2	299	Y	31	110	15,132	178
SAT	9/29/2018	7,723.14	65,161	34	3	297	2	299	Y	35	110	15,350	176
SUN	9/30/2018	7,722.41	64,620	28	3	297	2	299	Y	29	110	15,569	174
Averages		7,732.47	72,438	33	3	273	2	274			142		269
Totals (acft)				1,986	198	16,229	104	16,333			8,450	15,569	16,005

NOTES: Releases of water to support 15-Mile Reach target started 6/28 and ceased 10/18. A total of 19,496 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT  
 RUEDI RESERVOIR  
 RELEASES FOR ENDANGERED FISH  
 WATER YEAR 2018  
 October

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN RIVER GAGE BELOW DAM (CFS)	RUEDI CALLED OUT? (Y= YES) (N= NO)	REQUIRED MIN FLOW BELOW RUEDI w/o FISH REL (CFS)	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
MON	10/1/2018	7,721.74	64,125	32	1	280	2	282	Y	34	110	15,787	166
TUE	10/2/2018	7,721.10	63,655	10	1	246	2	248	Y	12	110	16,005	215
WED	10/3/2018	7,720.63	63,311	39	1	211	2	213	Y	41	110	16,223	218
THU	10/4/2018	7,720.25	63,033	43	1	182	2	184	Y	45	110	16,441	207
FRI	10/5/2018	7,719.93	62,800	44	1	160	2	162	Y	46	110	16,660	416
SAT	10/6/2018	7,719.62	62,575	41	1	153	2	155	Y	42	110	16,878	532
SUN	10/7/2018	7,719.32	62,357	44	1	153	2	155	Y	46	110	17,096	1,759
MON	10/8/2018	7,719.02	62,140	45	1	153	2	155	Y	46	110	17,314	940
TUE	10/9/2018	7,718.72	61,923	44	1	152	2	154	Y	45	110	17,532	760
WED	10/10/2018	7,718.48	61,750	56	1	143	2	144	N	58	110	17,751	811
THU	10/11/2018	7,718.36	61,663	69	1	112	2	113	N	71	110	17,969	1,216
FRI	10/12/2018	7,718.20	61,549	55	1	112	2	113	N	56	110	18,187	1,071
SAT	10/13/2018	7,718.02	61,419	47	1	111	2	113	N	49	110	18,405	910
SUN	10/14/2018	7,717.87	61,311	58	1	111	2	113	N	60	110	18,623	828
MON	10/15/2018	7,717.67	61,168	40	1	111	2	113	N	42	110	18,841	778
TUE	10/16/2018	7,717.47	61,025	40	1	111	2	113	N	42	110	19,060	814
WED	10/17/2018	7,717.31	60,910	55	1	111	2	113	N	56	110	19,278	772
THU	10/18/2018	7,717.16	60,803	48	1	101	2	102	N	49	110	19,496	747
FRI	10/19/2018	7,717.15	60,796	50	1	53	2	54	N	52	0	19,496	757
SAT	10/20/2018	7,717.15	60,796	42	1	41	2	42	N	44	0	19,496	749
SUN	10/21/2018	7,717.16	60,803	46	1	41	2	43	N	47	0	19,496	727
MON	10/22/2018	7,717.16	60,803	42	1	40	2	42	N	43	0	19,496	691
TUE	10/23/2018	7,717.18	60,817	49	1	41	2	42	N	51	0	19,496	670
WED	10/24/2018	7,717.21	60,839	52	1	41	2	42	N	54	0	19,496	659
THU	10/25/2018	7,717.22	60,846	45	1	40	2	42	N	47	0	19,496	727
FRI	10/26/2018	7,717.23	60,853	45	1	41	2	42	N	47	0	19,496	802
SAT	10/27/2018	7,717.23	60,853	42	1	40	2	42	N	43	0	19,496	770
SUN	10/28/2018	7,717.23	60,853	42	1	40	2	42	N	43	0	19,496	780
MON	10/29/2018	7,717.22	60,846	41	1	44	2	45	N	43	0	19,496	1,034
TUE	10/30/2018	7,717.21	60,839	43	1	45	2	47	N	44	0	19,496	1,064
WED	10/31/2018	7,717.20	60,832	42	1	45	2	47	N	44	0	19,496	1,087
Averages		7,718.21	61,558	45	1	105	2	107			64		764
Totals (acft)				2,756	69	6,475	108	6,583			3,927	19,496.0	46,965

NOTES: Releases of water to support 15-Mile Reach target started 6/28 and ceased 10/18. A total of 19,496 acre-feet was released to support Recovery Program target flows.

## 4. Fryingpan-Arkansas Project Transmountain Diversions WY2018

Fryingpan-Arkansas Project  
Unit: Acre-feet

	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
South Fork	42	3,896	900	0	0	0	4,838
No Name	0	1,310	286	0	0	0	1,597
Midway	11	2,355	1,422	0	0	0	3,788
Hunter	0	2,332	885	0	0	0	3,217
Sawyer	0	411	353	36			800
Chapman <sup>1</sup>	1	1,281	1,246	0			2,528
<b>Subtotal</b>							
	<b>54</b>	<b>11,585</b>	<b>5,092</b>	<b>36</b>	<b>0</b>	<b>0</b>	<b>16,767</b>
<b>Subtotal</b>							
Carter	66	1,295	886	0	0	0	2,247
North Fork	5	467	294	0	0	0	766
Mormon	30	1,443	824	0	0	0	2,297
North Cunningham	17	762	427	17	0	0	1,223
Middle Cunningham <sup>2</sup>	10	760	608	0	0	0	1,378
Ivanhoe	45	2,438	1,754	0	0	0	4,237
Granite	1	468	521	106	0	0	1,096
Fryingpan	91	5,123	1,337	0	0	0	6,551
Lily Pad	168	164	42	0	0	0	374
<b>Subtotal</b>							
	<b>433</b>	<b>12,920</b>	<b>6,693</b>	<b>123</b>	<b>0</b>	<b>0</b>	<b>20,169</b>
<b>Total</b>							
	<b>487</b>	<b>24,505</b>	<b>11,785</b>	<b>159</b>	<b>0</b>	<b>0</b>	<b>36,936</b>
<b>Subtotal</b>							
Boustead Tunnel <sup>3</sup>	Oct-Apr 1,427	26,089	12,769				40,285

<sup>1</sup> Does not include No Name, Hunter, Sawyer and Midway

<sup>2</sup> Includes South Cunningham

<sup>3</sup> The difference between the west slope diversion and Charles H. Boustead Tunnel diversion results from the accuracy limitations of the measurement, rounding and seepage

## 5. Fryingpan-Arkansas Project Imports - Charles H. Boustead Tunnel Outlet

Fryingpan-Arkansas Project  
Unit: 1,000 Acre-feet

<b>Water Year</b>	<b>Imports</b>	<b>Accumulated Imports</b>	<b>Twin Lakes Exchange</b>	<b>Available to SECWCD</b>
1972	32.0	32.0	0	0.0
1973	36.8	68.8	0	16.0
1974	34.1	102.9	0	18.6
1975	37.2	140.1	0	25.0
1976	26.9	167.0	0	24.0
1977	11.4	178.4	0	25.0
1978	49.2	227.6	0	25.0
1979	53.7	281.3	0	25.6
1980	55.7	337.0	0	70.0
1981	34.6	371.6	0	25.0
1982	75.2	446.8	2.7	68.0
1983	90.8	537.6	0.3	125.0
1984	110.1	647.7	1.9	210.0
1985 <sup>1</sup>	70.2	717.9	1.7	289.9
1986 <sup>1</sup>	30.3	748.2	1.5	300.3
1987 <sup>1</sup>	2.2	750.4	1.1	288.0
1988 <sup>1</sup>	13.4	763.8	2.0	247.8
1989	36.2	800.0	1.7	197.6
1990	46.6	846.6	1.7	142.1
1991	59.1	905.7	1.5	58.7
1992	54.8	960.5	1.2	32.9
1993	86.6	1047.1	2.3	70.1
1994	52.2	1099.3	1.3	51.7
1995	90.5	1189.8	2.3	55.0
1996 <sup>1</sup>	36.9	1226.7	1.8	110.0
1997	78.6	1305.3	1.8	116.0
1998	51.3	1356.6	2.6	102.0
1999 <sup>1</sup>	40.8	1397.4	2.1	127.5
2000	44.8	1442.2	1.7	171.6
2001	45.3	1487.5	2.1	67.5
2002	13.2	1500.7	1.5	8.5
2003	54.9	1555.6	2.4	37.5
2004	27.4	1583.0	1.3	15.3
2005	54.6	1637.6	3.0	40.8
2006	61.2	1698.8	3.0	49.2
2007	54.2	1753.0	3.0	40.4

<b>Water Year</b>	<b>Imports</b>	<b>Accumulated Imports</b>	<b>Twin Lakes Exchange</b>	<b>Available to SECWCD</b>
2008	90.0	1843.0	3.0	83.0
2009	82.7	1925.7	3.0	78.0
2010	56.5	1982.2	3.0	44.0
2011	98.9	2081.1	2.3	75.0
2012	13.4	2094.5	1.5	9.9
2013	46.7	2141.2	2.8	37.6
2014	80.3	2221.5	3.0	56.0
2015	72.2	2293.7	1.9	67.9
2016	59.2	2353.0	2.5	39.1
2017	67.0	2420.0	2.0	46.3
2018	39.2	2459.2	3.0	

<sup>1</sup>Imports impeded

Restriction: Not to exceed 120 KAF in 1 year

Not to exceed 2,352.8 KAF acre-feet in 34 consecutive years.

The imports between 1984 and 2018 are 1921.4 KAF

1983 includes 3,120 acre-feet imported through the Twin Lakes Tunne

## 6. Turquoise Lake Operations WY2018

Fryingpan-Arkansas Project  
Unit: 1,000 AF

Month	Busk-Ivanhoe Imports through Carlton Tunnel	Busk-Ivanhoe Imports through Boustead Tunnel	Imports through Homestake Tunnel	Project Imports		Native Inflow	Total Inflow	Evap	Total Outflow	End of Month Content	Water Surface Elevation (feet msl)
OCT 2017	0.0	0	1.0	0.1		0.5	1.6	0.4	1.3	115.8	9,861.7
NOV 2017	0.0	0	0.0	0.1		1.5	1.6	0.2	17.1	100.1	9,852.4
DEC 2017	0.0	0	0.0	0.0		0.5	0.5	0.0	4.3	96.2	9,850.1
JAN 2018	0.0	0	0.0	0.0		0.4	0.4	0.0	1.1	95.5	9,849.7
FEB 2018	0.0	0	0.0	0.0		0.4	0.4	0.0	1.0	95.0	9,849.3
MAR 2018	0.0	0	0.0	0.0		1.4	1.4	0.0	16.4	79.9	9,839.9
APR 2018	0.6	0	6.1	0.4		2	9.1	0.0	12.2	76.7	9,837.8
MAY 2018	0.7	0	12.1	25.9		8.7	47.4	0.4	24.5	99.2	9,851.9
JUN 2018	0.0	0	1.1	12.6		4.9	18.6	0.8	7.7	109.3	9,857.9
JUL 2018	0.0	0	0.0	0.0		1.4	1.4	0.6	1.9	108.2	9,857.2
AUG 2018	0.0	0	0.0	0.0		0.5	0.5	0.5	1.4	106.6	9,856.3
SEP 2018	0.0	0	0.0	0.0		0.6	0.6	0.5	6.7	100.0	9,852.3
<b>Total*</b> <b>(acre-feet)</b>	1,490.4	0	20,291.4	39,156.2		22,800	83,225.	3,498.	95,618.		

\*Rounding may introduce discrepancies between monthly and yearly totals

## 7. Twin Lakes/Mt. Elbert Forebay Water Year 2018 Operations

Fryingpan-Arkansas Project  
Unit: 1,000 Acre-Feet

Date	Twin Lakes Canal Company			Mt. Elbert Conduit				Twin Lakes					
	Imports	Winter Water	Priority/ Native	Leadville Fish Hatchery <sup>4</sup>	Halfmoon	Sugarloaf Bypass	Sugarloaf Powerplant	Native Inflow	Total Inflow	Evap <sup>2</sup>	Total Outflow	End of Month Content <sup>2</sup>	Water Elevation <sup>3</sup> (feet msl)
OCT 17	1.4	0.0	0.0	0.3	0.1	0.4	0.0	2.1	3.9	0.6	9.2	124.5	9,190.23
NOV 17	0.7	0.4	0.0	0.3	0.0	0.4	16.1	-0.1	17.0	0.4	16.9	124.1	9,189.95
DEC 17	0.4	0.1	0.0	0.3	0.0	0.4	3.3	-0.1	4.1	0.1	13.3	114.9	9,185.87
JAN 18	0.3	1.1	0.0	0.3	0.0	0.5	0.0	1.2	2.0	0.0	9.4	107.5	9,182.40
FEB 18	0.2	1.2	0.0	0.3	0.0	0.5	0.0	1.0	1.8	0.0	8.2	101.1	9,179.19
MAR 18	0.2	0.2	0.3	0.3	0.0	0.6	15.3	-0.6	15.4	0.0	1.4	115.1	9,186.04
APR 18	0.4	0.0	0.4	0.3	0.0	0.6	11.0	0.2	12.1	0.4	10.7	116.0	9,186.56
MAY 18	15.1	0.0	3.0	0.3	0.4	0.6	22.6	15.0	53.7	1.0	43.5	125.2	9,190.59
JUN 18	11.7	0.0	3.7	0.3	3.6	0.6	5.8	14.3	36.0	1.4	26.8	133.0	9,193.82
JUL 18	0.3	0.0	0.6	0.3	0.8	0.6	0.0	5.1	6.8	0.9	25.9	113.0	9,185.64
AUG 18	0.0	0.0	0.3	0.3	0.1	0.6	0.0	2.6	3.4	0.8	15.1	100.6	9,179.71
SEP 18	0.0	0.0	0.0	0.3	0.0	0.5	5.7	1.1	7.4	0.8	1.1	106.1	9,181.74
<b>TOTAL<sup>1</sup> (acre-feet)</b>	30,633	3,160	8,382	3,909	5,019	6,145	79,876	41,748	132,788	5,776	181,526		

<sup>1</sup> Rounding may introduce discrepancies between monthly and yearly totals

<sup>2</sup> Both Twin Lakes and Mt. Elbert Forebay

<sup>3</sup> Elevation of Twin Lakes

<sup>4</sup> Leadville Fish Hatchery diverts from Mt Elbert Conduit



## 8. Mt. Elbert Pumped-Storage Power Plant Water Year 2018 Operations

Fryingpan-Arkansas Project

Month	Year	Station Service	Net Generation	Gross Generation	Inflow to Mt. Elbert	Water Through Generator	Water Pumped From Twin Lakes To Forebay
OCT	2017	264456	16222000	16486456	543	53814	52966
NOV	2017	303170	18155000	18458170	16374	57744	42384
DEC	2017	378063	18079000	18457063	3661	56498	52762
JAN	2018	390739	17216000	17606739	492	54490	53972
FEB	2018	386866	14585000	14971866	478	44642	45235
MAR	2018	389020	21521000	21910020	15726	64379	49435
APR	2018	262153	20853000	21115153	11487	63379	52701
MAY	2018	215147	28500000	28715147	23282	81968	59161
JUN	2018	232486	24644000	24876486	9965	75081	65928
JUL	2018	205188	32692000	32897188	1357	92341	90374
AUG	2018	210292	36387000	36597292	618	98399	97819
SEP	2018	204359	24146000	24350359	6016	67480	65848
	<b>TOTALS</b>	<b>3441939</b>	<b>273000000</b>	<b>276441939</b>	<b>89999</b>	<b>810215</b>	<b>728585</b>

## 9. Pueblo Reservoir Water Year 2018 Operations

Fryingpan-Arkansas Project  
Unit: 1,000 AF

Month	Inflow				Evap	Total Outflow	End of Month Content	Water Surface Elevation (feet msl)
	Project	Contract	Native <sup>2</sup>	Total				
OCT 17	6.6	2.52	30.98	40.1	1.4	32.4	210.2	4,871.97
NOV 17	8.9	1.06	29.44	39.4	0.7	20.1	228.7	4,876.52
DEC 17	4.9	1.99	22.01	28.9	0.6	8.3	248.7	4,881.13
JAN 18	1.4	8.95	13.85	24.2	0.6	7.8	264.6	4,884.54
FEB 18	1.0	22.04	0	18.8	0.8	6.2	276.4	4,886.99
MAR 18	0.9	8.66	9.14	18.7	1.6	33.5	259.7	4,883.51
APR 18	5.0	17.62	0	19.7	2.4	43.2	233.7	4,877.71
MAY 18	14.0	5.14	50.96	70.1	2.9	62.6	238.3	4,878.77
JUN 18	0.3	2.61	40.79	43.7	3.8	55.7	222.5	4,875.03
JUL 18	10.2	10.09	11.11	31.4	2.9	40.9	210.2	4,871.98
AUG 18	2.2	12.10	0	14.3	2.4	17.5	204.6	4,870.54
SEP 18	0.3	6.69	2.51	9.5	2.1	22.5	189.5	4,866.53
<b>Total<sup>1</sup> (acre-feet)</b>	<b>55,752</b>	<b>99,459</b>	<b>203,563</b>	<b>358,774</b>	<b>22,054</b>	<b>350,735</b>		

<sup>1</sup> Rounding may introduce discrepancies

<sup>2</sup> Native inflows are the total inflows less the account and project inflow. If the result is negative because of exchanges, 0 is recorded.

## 10. Reservoir Storage Allocation Data

Fryingpan-Arkansas Project  
Unit: Acre-Feet

Reservoir	Dead	Inactive	Active Conservation	Joint Use	Exclusive Flood Control	Total Capacity Storage
Ruedi <sup>1</sup>	63	1,095	101,278	0	0	102,373
Turquoise <sup>1</sup>	2,810	8,920	120,478	0	0	129,398
Twin Lakes <sup>1</sup>	63,324	72,938	67,917	0	0	140,855 <sup>2</sup>
Mt. Elbert <sup>1</sup> Forebay	561	3,825	3,493	0	0	11,143
Pueblo <sup>3</sup>	1,895	25,601	219,772	66,011	26,990	469,878

<sup>1</sup> Area Capacity Table from 1984

<sup>2</sup> The top of the active conservation pool at Twin Lakes corresponds to 140,855 acre-feet. A tilted morning glory spillway reduces the actual storage available to 140,357 acre-feet

<sup>3</sup> Area Capacity Table from 2012

Note: Inactive includes dead storage

# 11. Monthly Evaporation Factors

Fryingpan-Arkansas Project

Month	Ruedi	Turquoise	Twin Lakes	Pueblo
Oct	0.0530	0.1217	0.1217	0.1366
Nov	0	0.0566	0.0566	0.0886
Dec	0	0.0171	0.0171	0.0735
Jan	0	0.0274	0.0274	0.07078
Feb	0	0.0497	0.0497	0.10592
Mar	0	0.0771	0.0771	0.1548
Apr	0	0.1337	0.1337	0.1760
May	0.1470	0.2006	0.2006	---
Jun	0.3605	0.2554	0.2554	---
Jul	0.3244	0.2246	0.2246	---
Aug	0.2332	0.1766	0.1766	---
Sep	0.1419	0.1663	0.1663	---

Note: These factors are used only when the pan is frozen or unavailable. Ruedi does not have a pan.

Factor is derived from  $((\text{the average monthly evaporation volume} * 12) / 0.7) / (\# \text{ days in month})$

Evaporation in acre-feet = monthly factor \* surface area of the lake \* (1 - percent ice cover)

## 12. Monthly Evaporation

Fryingpan-Arkansas Project  
Unit=Acre-Feet

Month	Ruedi		Turquoise		Twin Lakes and Mt. Elbert		Pueblo	
	AVG	WY 2018	AVG	WY 2018	AVG	WY 2018	AVG	WY 2018
OCT 2017	53	80	360	381	521	529	1,090	1,365
NOV 2017	0	0	161	186	230	337	565	748
DEC 2017	0	0	16	28	26	46	446	580
JAN 2018	0	0	0	0	1	6	409	571
FEB 2018	0	0	0	0	3	7	602	793
MAR 2018	0	0	0	0	24	19	1,267	1,557
APR 2018	6	0	11	0	204	397	1,725	2,411
MAY 2018	160	215	274	387	842	888	2,149	2,900
JUN 2018	463	572	732	835	1,230	1,314	2,700	3,776
JUL 2018	508	539	599	606	973	808	2,491	2,854
AUG 2018	306	368	474	530	765	703	2,015	2,383
SEP 2018	172	198	422	545	695	720	1,663	2,115

Average between 1996 and 2018

### 13. Monthly Precipitation

Fryingpan-Arkansas Project  
Unit=Inches

MONTH	CHAPMAN <sup>1</sup> NEAR RUEDI		TURQUOISE		TWIN LAKES		PUEBLO	
	AVG	WY 2018	AVG	WY 2018	AVG	WY 2018	AVG	WY 2018
OCT 17	2.34	3.10	1.09	1.38	0.85	1.06	0.80	0.23
NOV 17	1.98	1.60	1.26	1.12	0.48	1.04	0.35	0.33
DEC 17	3.25	2.50	1.43	1.65	0.50	0.65	0.30	0.08
JAN 18	3.05	2.10	1.69	1.15	0.51	0.68	0.35	0.20
FEB 18	2.80	3.00	1.49	1.38	0.48	0.54	0.37	0.51
MAR 18	2.80	2.10	1.33	0.62	0.54	0.18	0.84	0.43
APR 18	3.72	4.40	1.73	2.43	0.87	1.61	1.83	0.46
MAY 18	3.08	0.70	1.51	0.25	0.91	0.28	1.43	0.60
JUN 18	1.02	1.10	0.82	0.57	0.73	0.39	0.89	0.36
JUL 18	3.01	0.80	2.08	1.32	1.87	1.92	1.82	2.37
AUG 18	2.57	1.90	2.09	0.92	1.55	0.84	2.20	1.03
SEP 18	1.95	0.60	1.53	1.12	1.16	0.76	0.74	0.90
<b>TOTAL</b>	31.57	23.90	18.05	13.91	10.44	9.95	11.91	7.50
<b>Max. Annual</b>	40.9	(2011)	25.95	(1957)	17.27	(1952)	20.32	(2007)

<sup>1</sup> The USGS weather station at Ruedi was out of service for WY2018. The precipitation averages and totals from the Chapman Snotel have been substituted. The Snotel has been in operation since 2008.

## 14. Flood Control Benefits

### Fryingpan-Arkansas Project

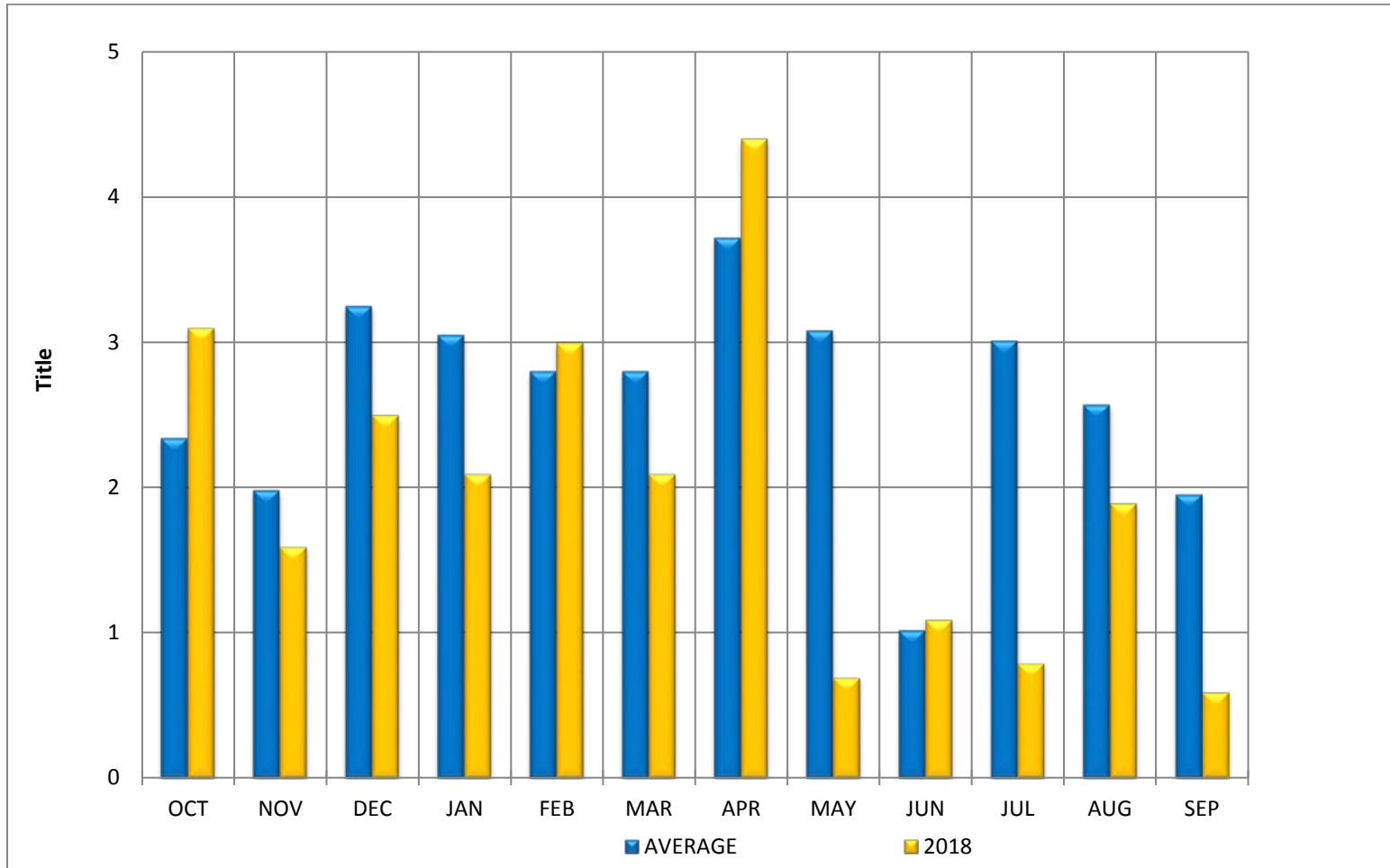
WY	Ruedi Benefits WY2018	Ruedi Benefits Cumulative	Pueblo Benefits WY2018	Pueblo Benefits Cumulative
1976			\$320,000	\$320,000
1979			\$90,000	\$410,000
1980			\$86,000	\$496,000
1981			\$111,000	\$607,000
1982			\$836,000	\$1,443,000
1983	\$80,000	\$80,000	\$47,000	\$1,490,000
1984	\$330,000	\$410,000	\$1,039,000	\$2,529,000
1985	\$91,000	\$501,000	\$234,000	\$2,763,000
1986	\$70,000	\$571,000	\$0	\$2,763,000
1987	\$0	\$571,000	\$90,000	\$2,853,000
1988	\$0	\$571,000	\$0	\$2,853,000
1989	\$0	\$571,000	\$0	\$2,853,000
1990	\$0	\$571,000	\$0	\$2,853,000
1991	\$0	\$571,000	\$482,000	\$3,335,000
1992	\$0	\$571,000	\$266,000	\$3,601,000
1993	\$4,000	\$575,000	\$496,000	\$4,097,000
1994	\$280,000	\$855,000	\$290,000	\$4,387,000
1995	\$1,770,000	\$2,625,000	\$832,000	\$5,219,000
1996	\$1,550,000	\$4,175,000	\$0	\$5,219,000
1997	\$1,207,000	\$5,382,000	\$320,200	\$6,539,200
1998	\$0	\$5,382,000	\$0	\$6,539,200
1999	\$116,000	\$5,498,000	\$4,778,000	\$11,317,200
2000	\$1,061,000	\$6,559,000	\$0	\$11,317,200
2001	\$0	\$6,559,000	\$0	\$11,317,200
2002	\$0	\$6,559,000	\$0	\$11,317,200
2003	\$1,515,100	\$8,074,100	\$0	\$11,317,200
2004	\$0	\$8,074,100	\$0	\$11,317,200
2005	\$970,200	\$9,044,300	\$0	\$11,317,200
2006	\$799,000	\$9,843,300	\$20,159,000	\$31,476,200
2007	\$103,000	\$9,946,300	\$0	\$31,476,200
2008	\$1,635,000	\$11,581,300	\$0	\$31,476,200
2009	\$740,100	\$12,321,400	\$0	\$31,476,200
2010	\$2,993,000	\$15,314,400	\$0	\$31,476,200

<b>WY</b>	<b>Ruedi Benefits WY2018</b>	<b>Ruedi Benefits Cumulative</b>	<b>Pueblo Benefits WY2018</b>	<b>Pueblo Benefits Cumulative</b>
2011	\$3,002,000	\$18,316,400	\$0	\$31,476,200
2012	\$0	\$18,316,400	\$0	\$31,476,200
2013	\$0	\$18,316,400	\$383,900	\$31,860,100
2014	\$0	\$18,316,400	\$431,900	\$32,292,000
2015	\$1,402,300	\$19,718,700	\$4,493,000	\$36,785,000
2016	\$0	\$19,718,700	\$0	\$36,785,000
2017	\$0	\$19,718,700	\$0	\$36,785,000
2018	\$0	\$19,718,700	\$0	\$36,785,000



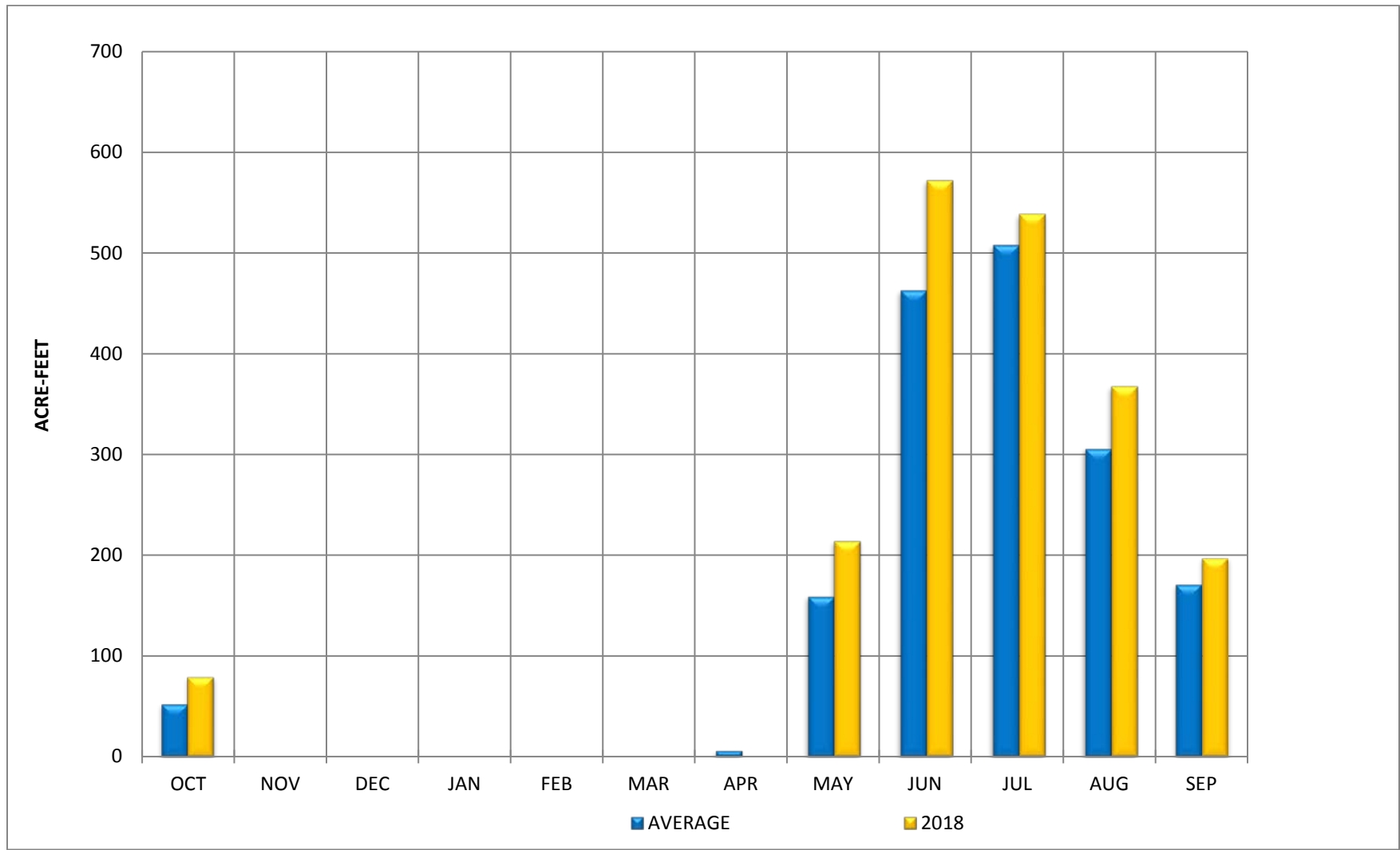
# Appendix B: Exhibits

# 1. Chapman Snotel Monthly Precipitation WY2018

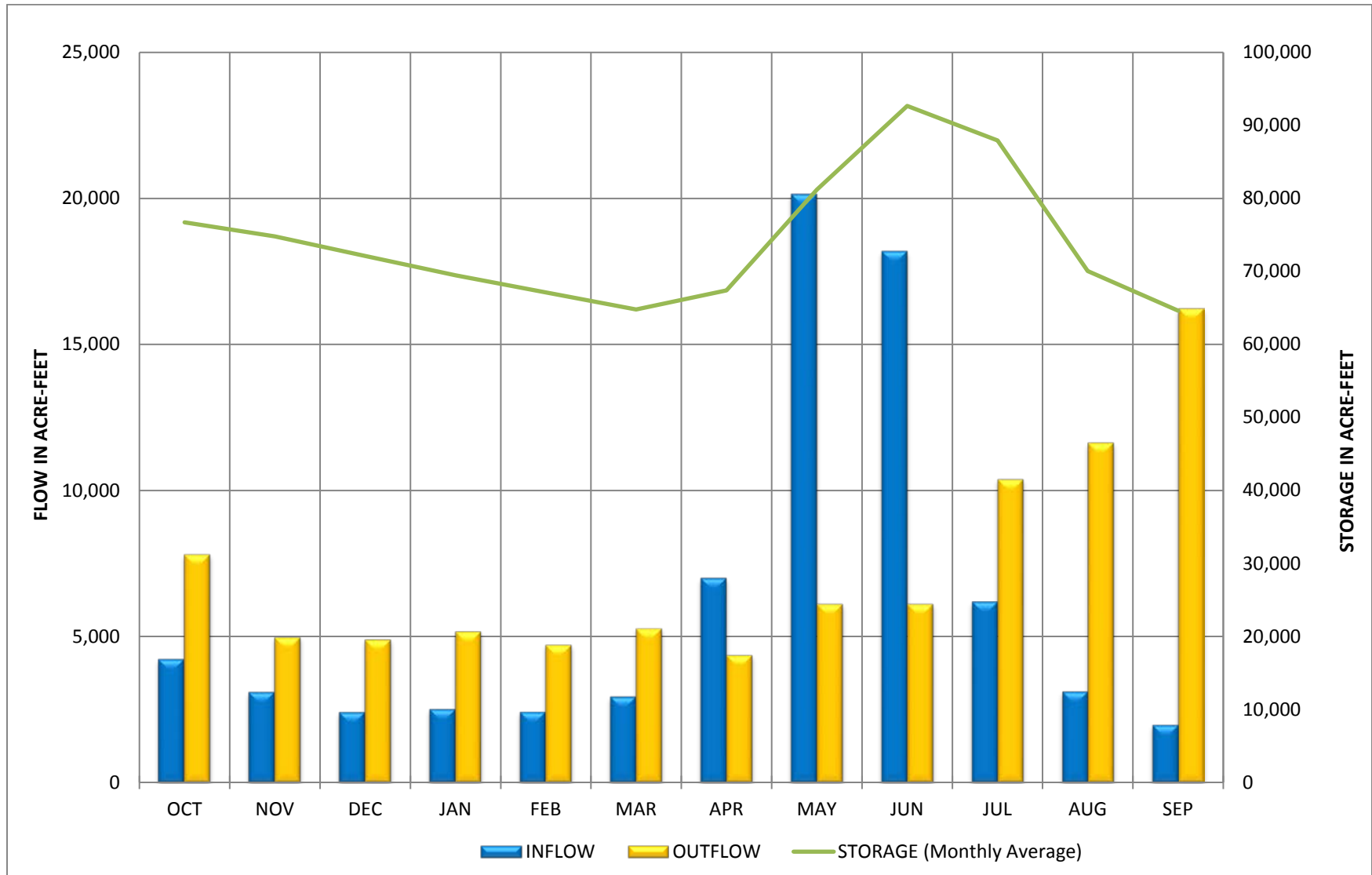


The weather station at Ruedi was out of service for the year. These precipitation values are from the Chapman Snotel gage

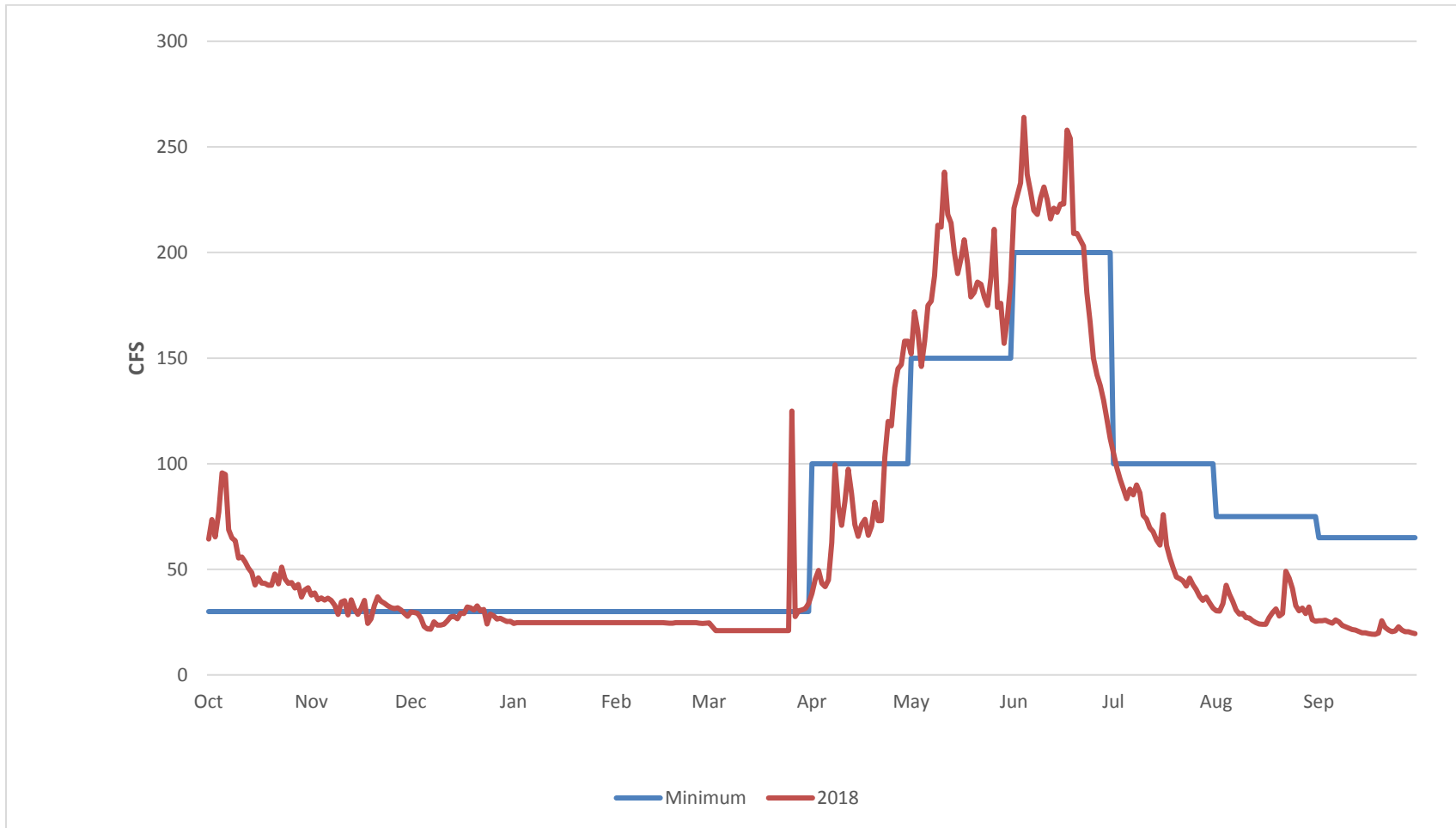
## 2. Ruedi Reservoir Monthly Evaporation WY2018



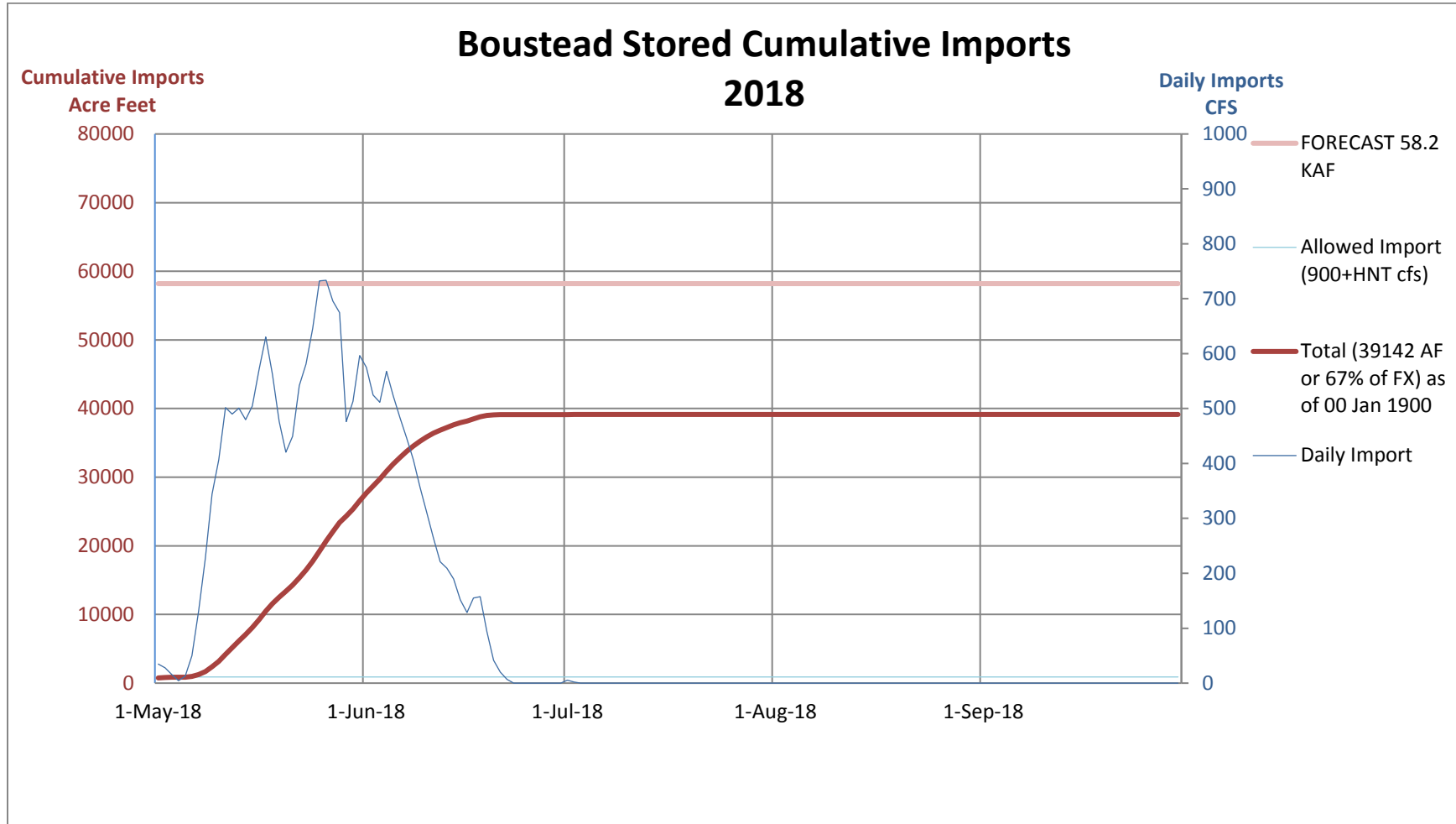
### 3. Ruedi Reservoir Actual Operations WY2018



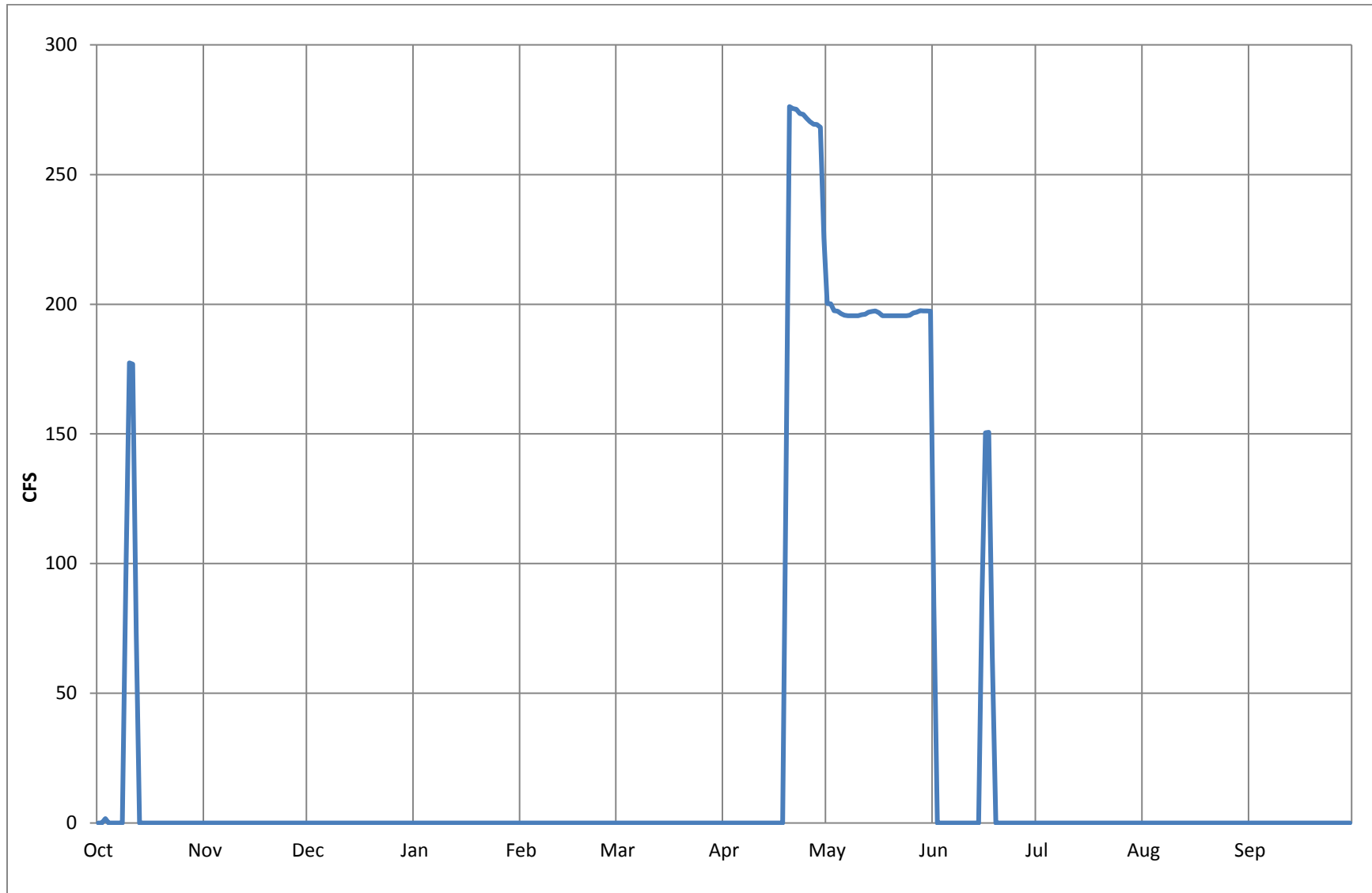
#### 4. Fryingpan River near Thomasville Daily Discharge WY2018



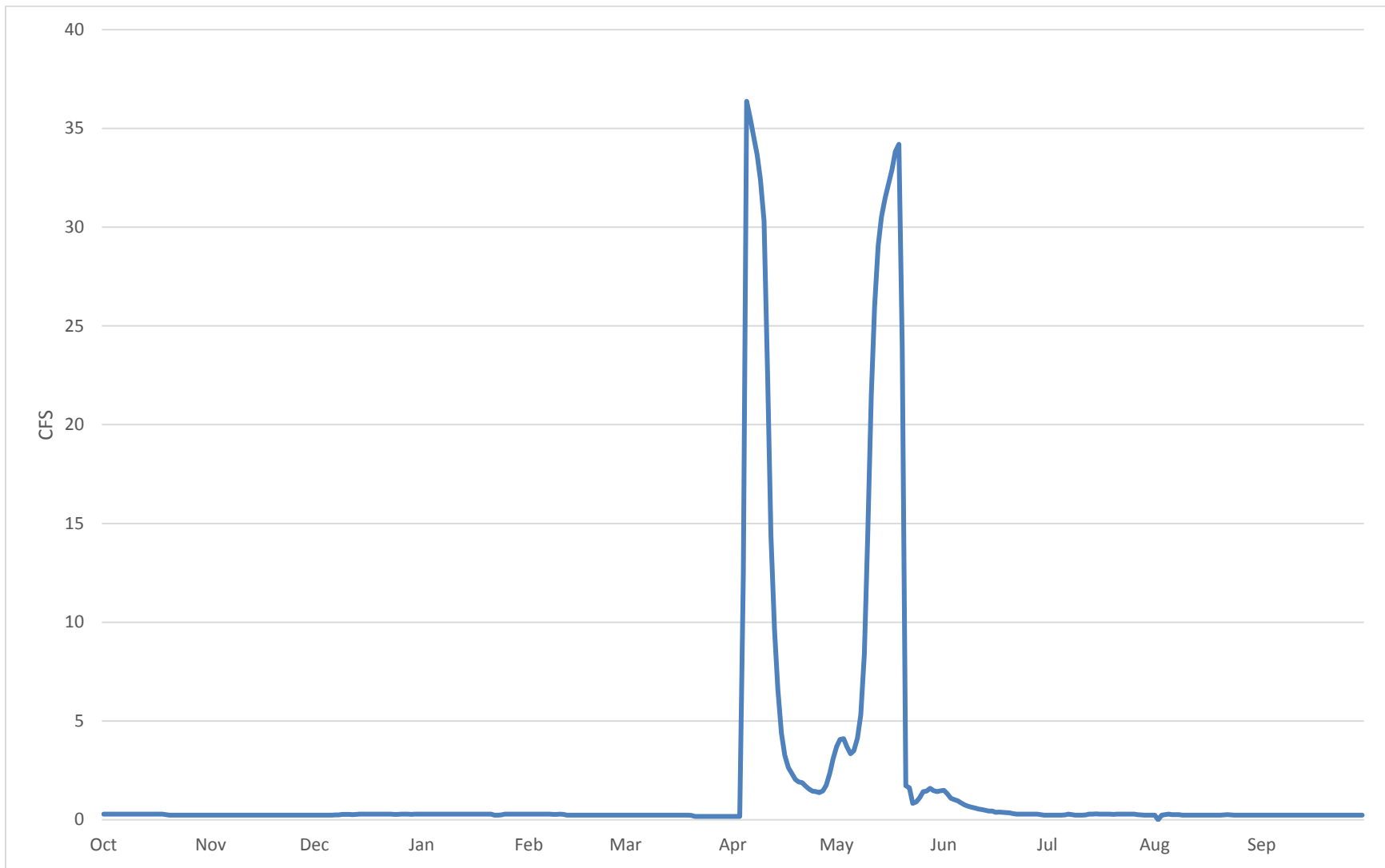
## 5. Boustead Tunnel Actual Operations WY2018



## 6. Homestake Tunnel Actual Operations WY2018

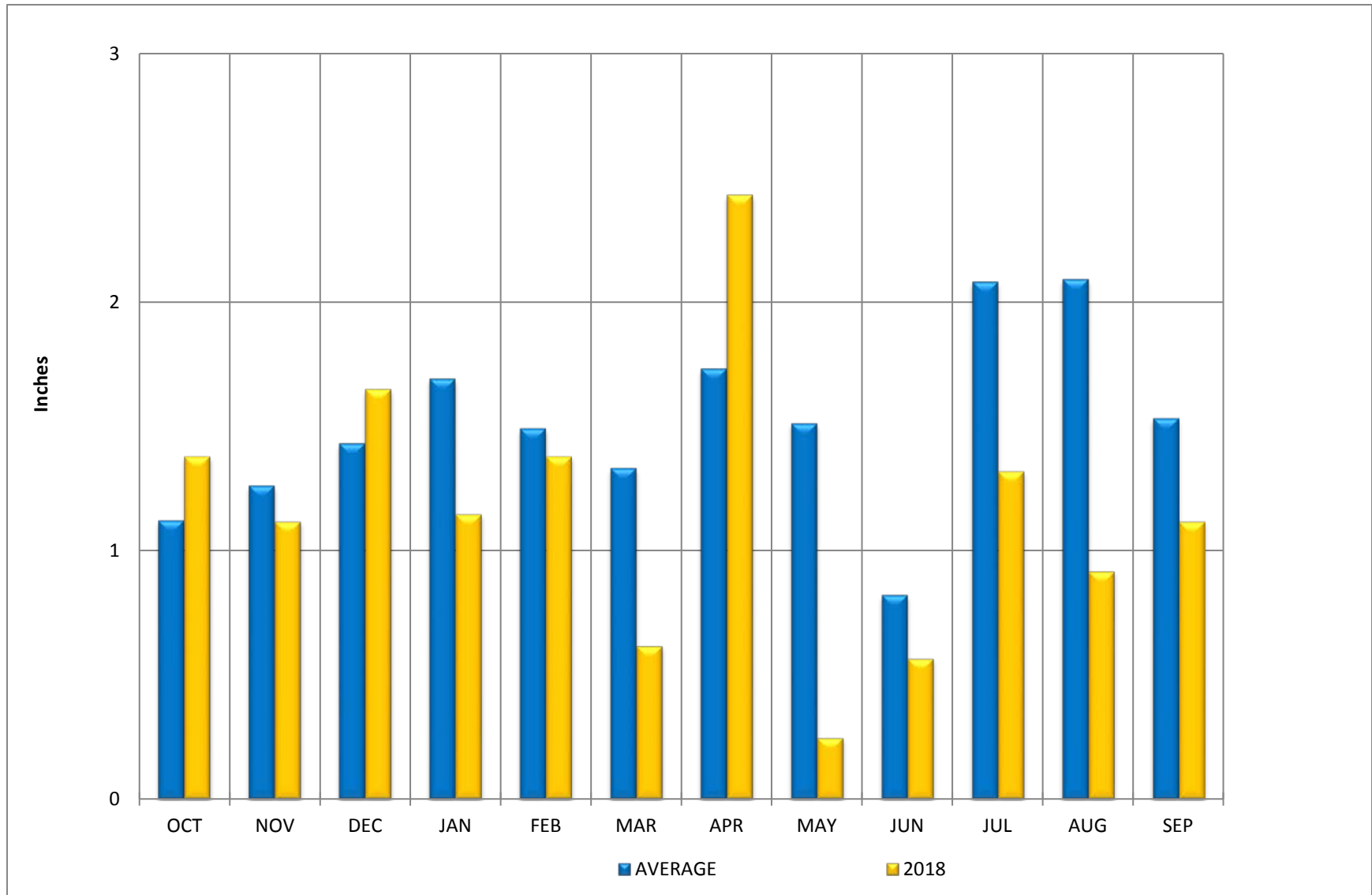


## 7. Busk-Ivanhoe Tunnel Actual Operations WY2018

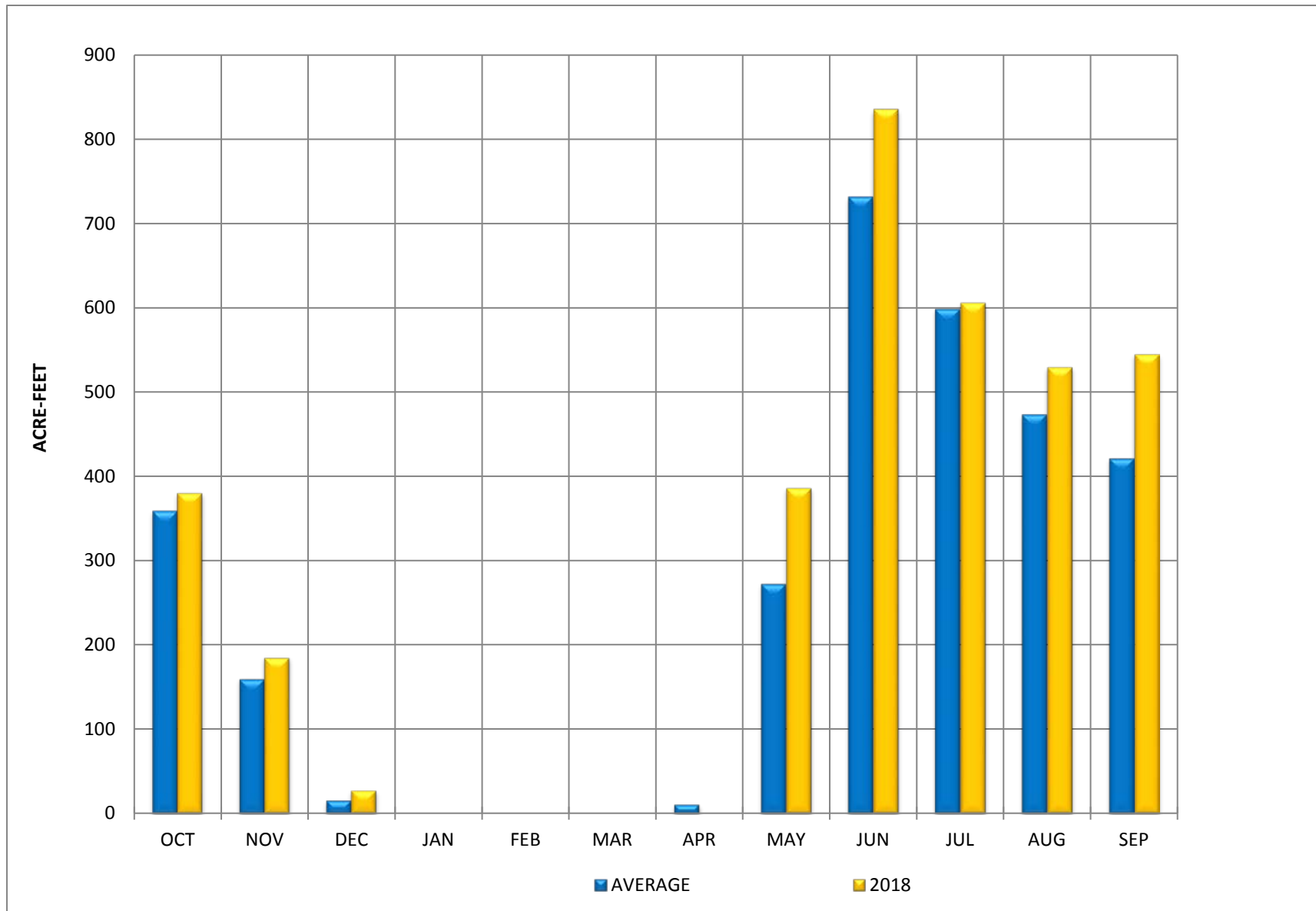




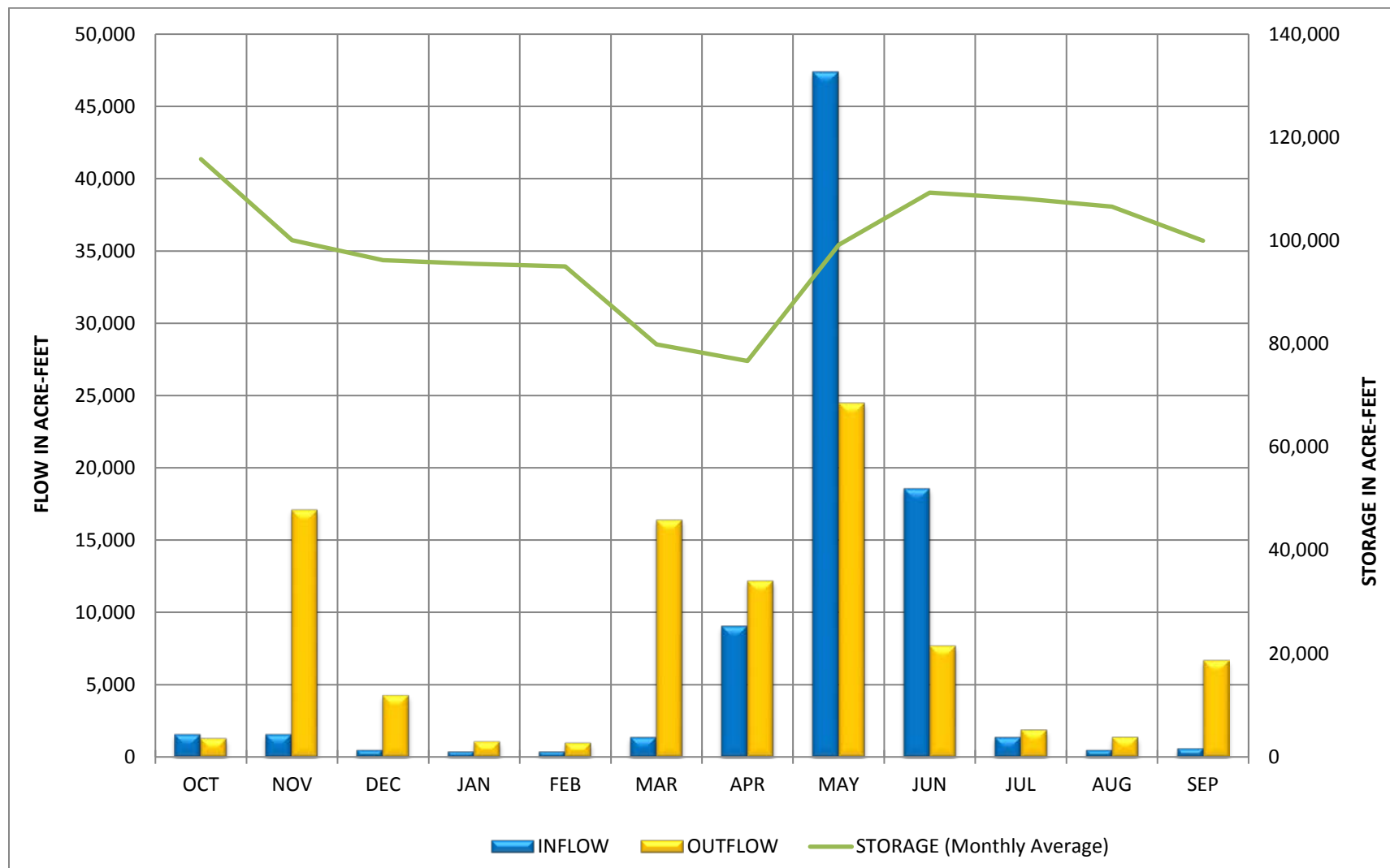
## 8. Turquoise Lake (Sugar Loaf Dam) Monthly Precipitation WY2018



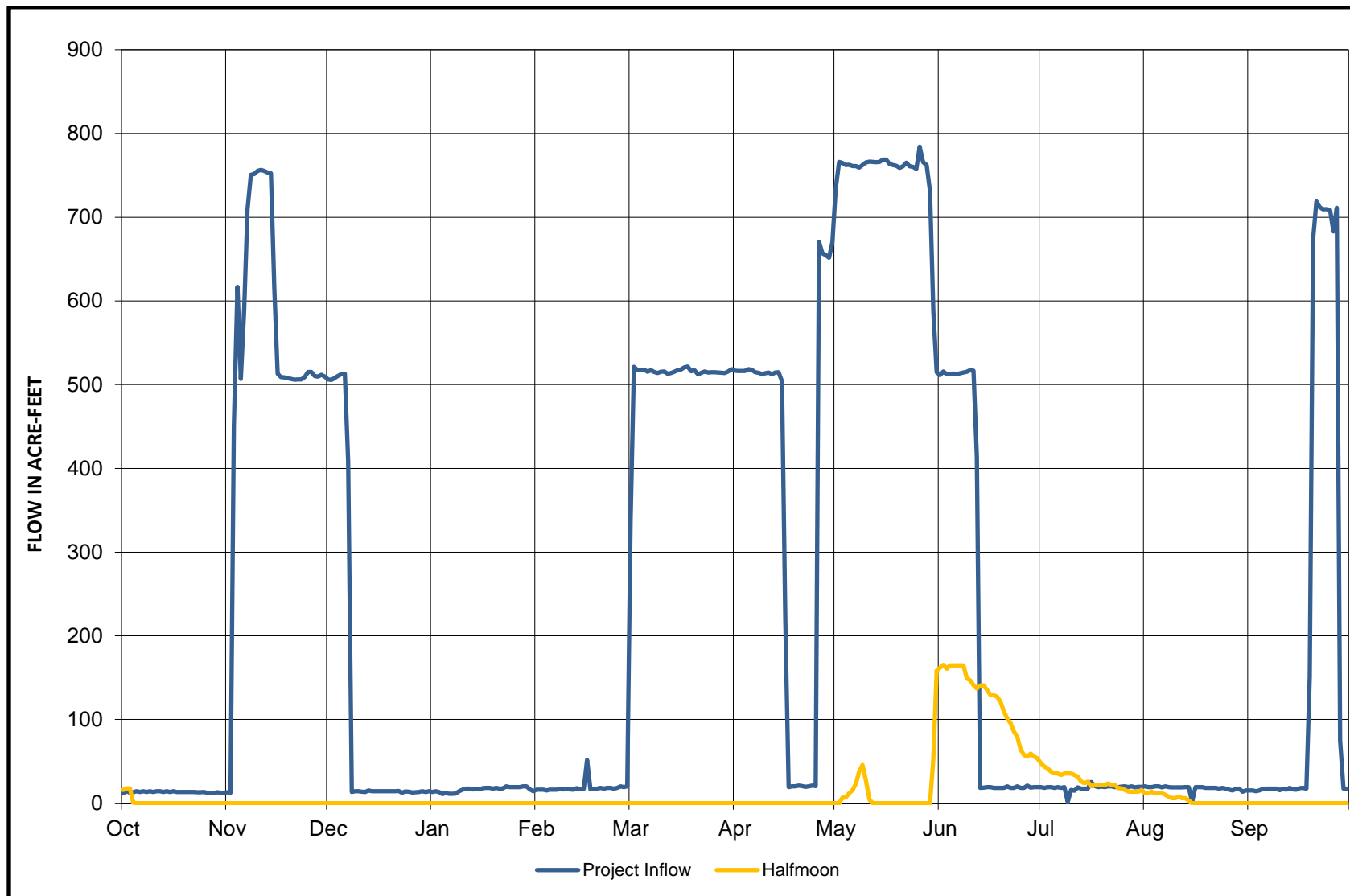
## 9. Turquoise Lake (Sugar Loaf Dam) Monthly Evaporation WY2018



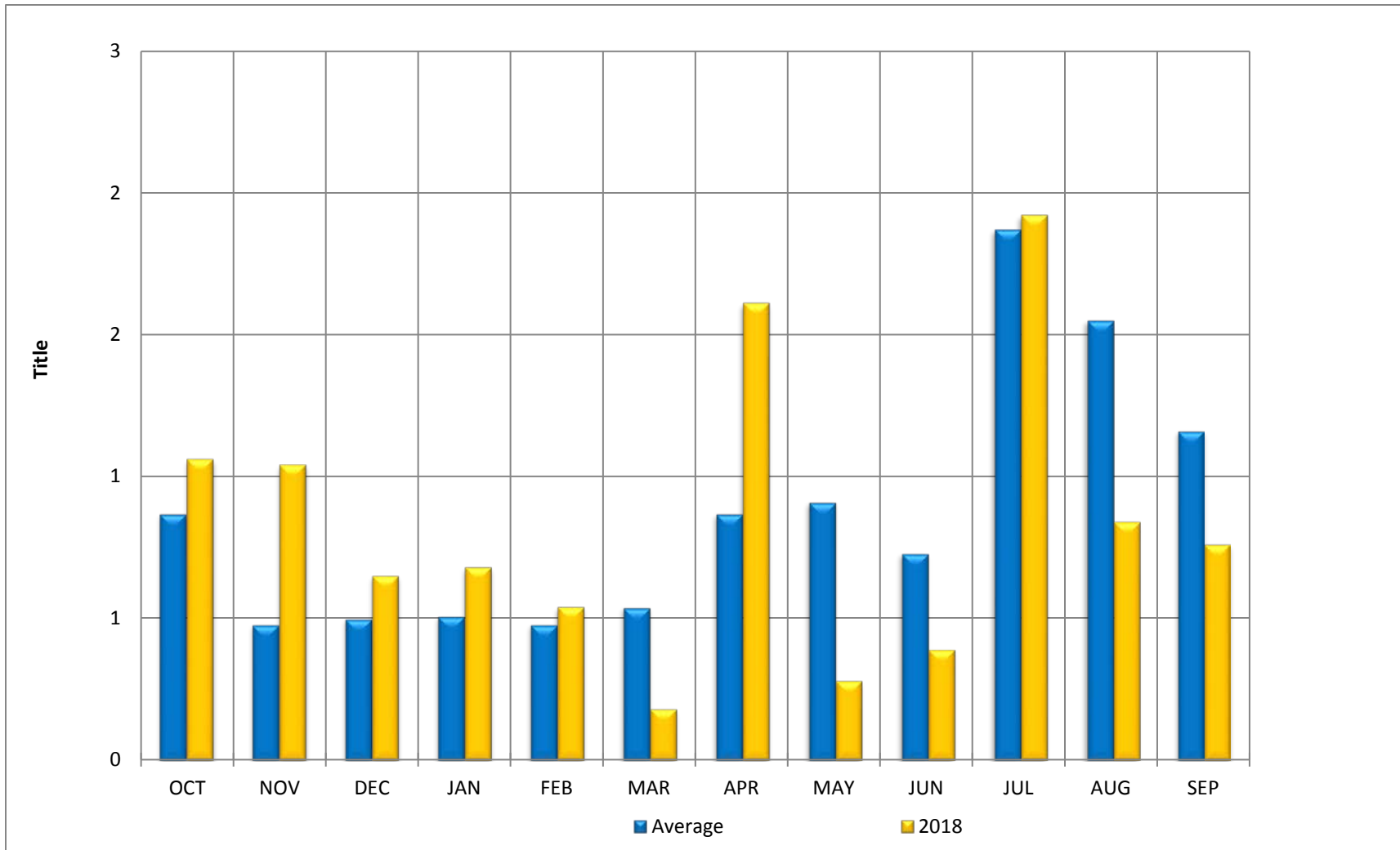
### 10. Turquoise Lake (Sugarloaf Dam) Actual Operations WY2018



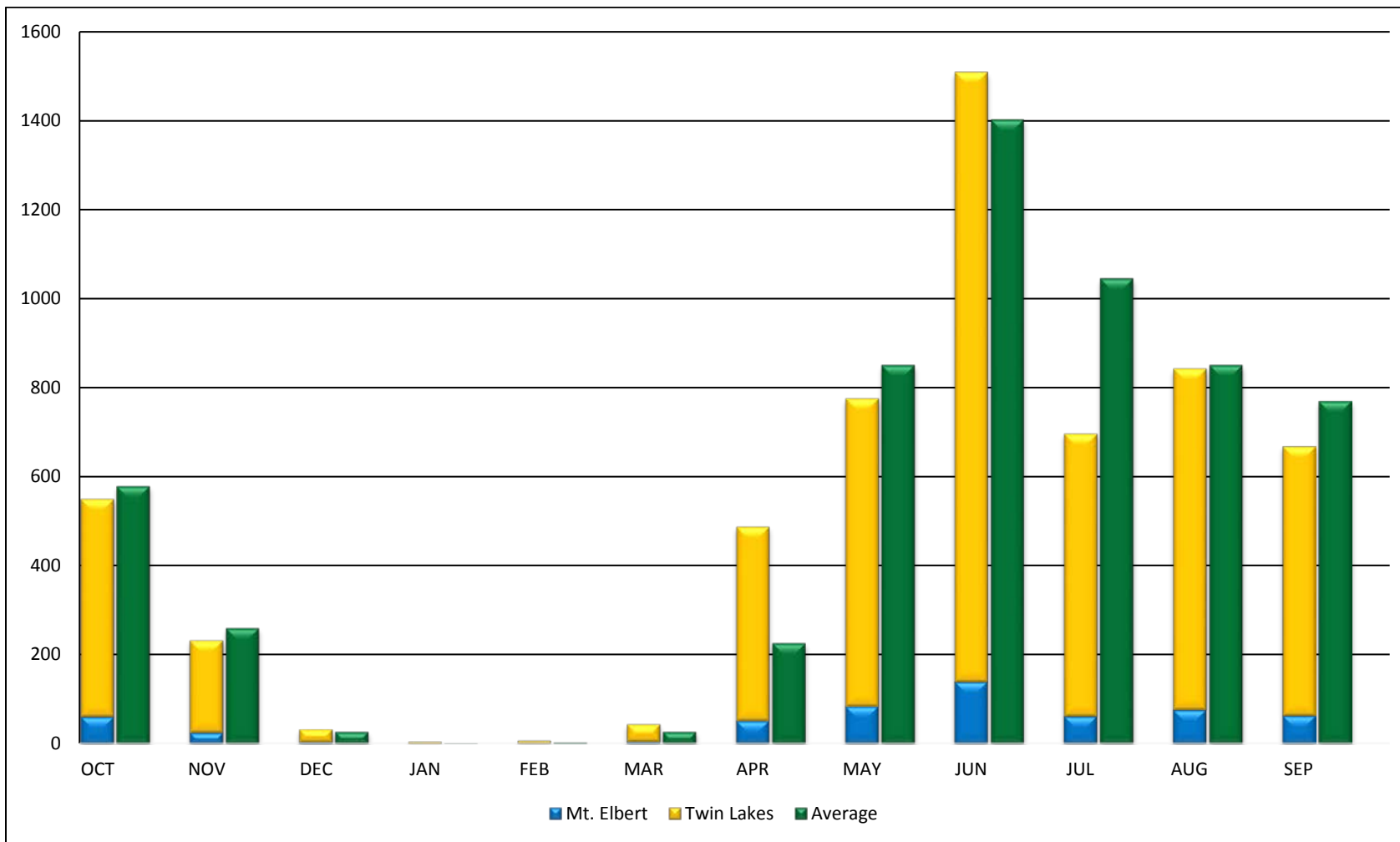
# 11. Mt. Elbert Conduit Inflow Actual Operations WY2018



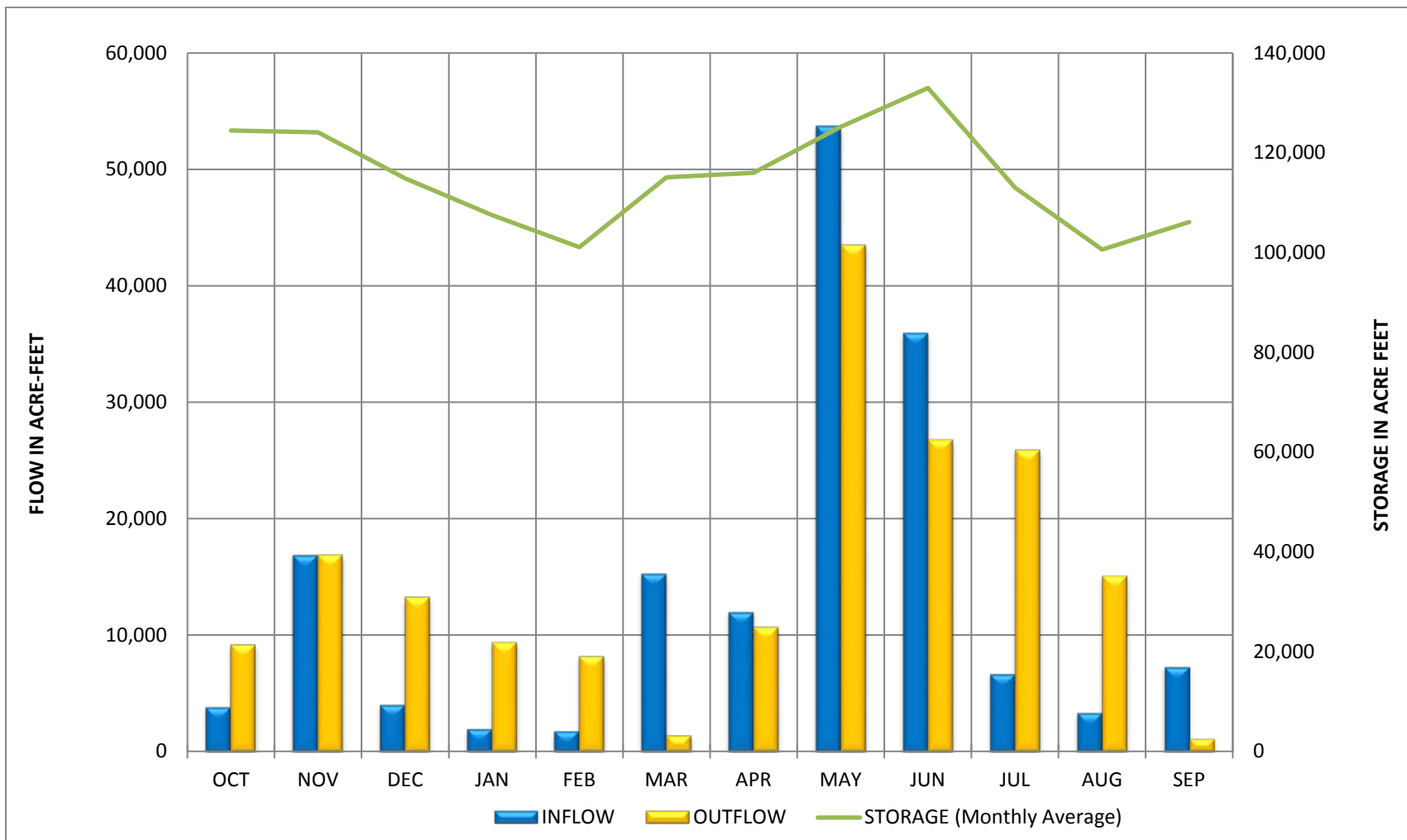
## 12. Twin Lakes Monthly Precipitation WY2018



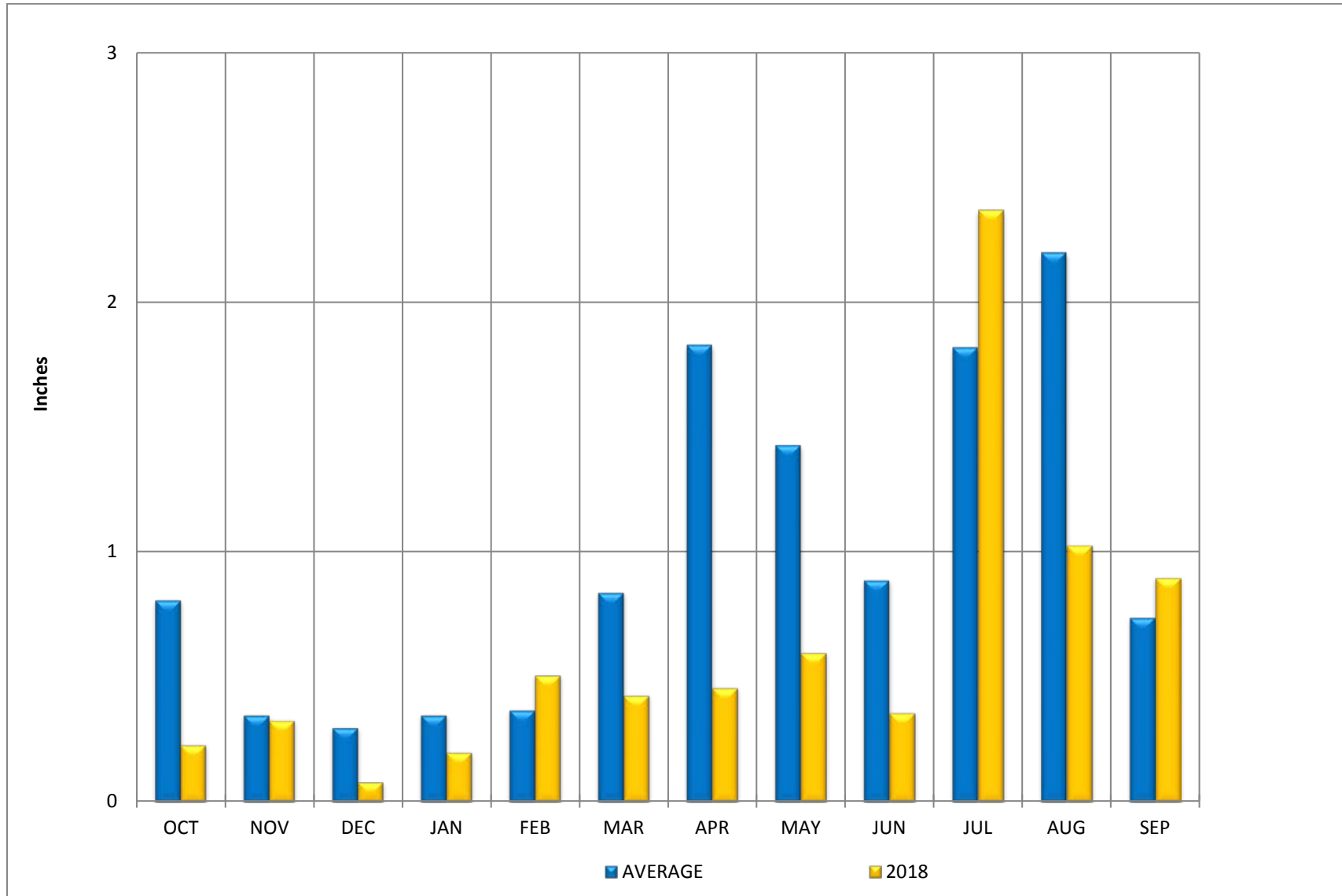
### 13. Twin Lakes Dam and Mt. Elbert Forebay Monthly Evaporation WY2018



### 14. Twin Lakes/Mt. Elbert Forebay Actual Operations WY2018

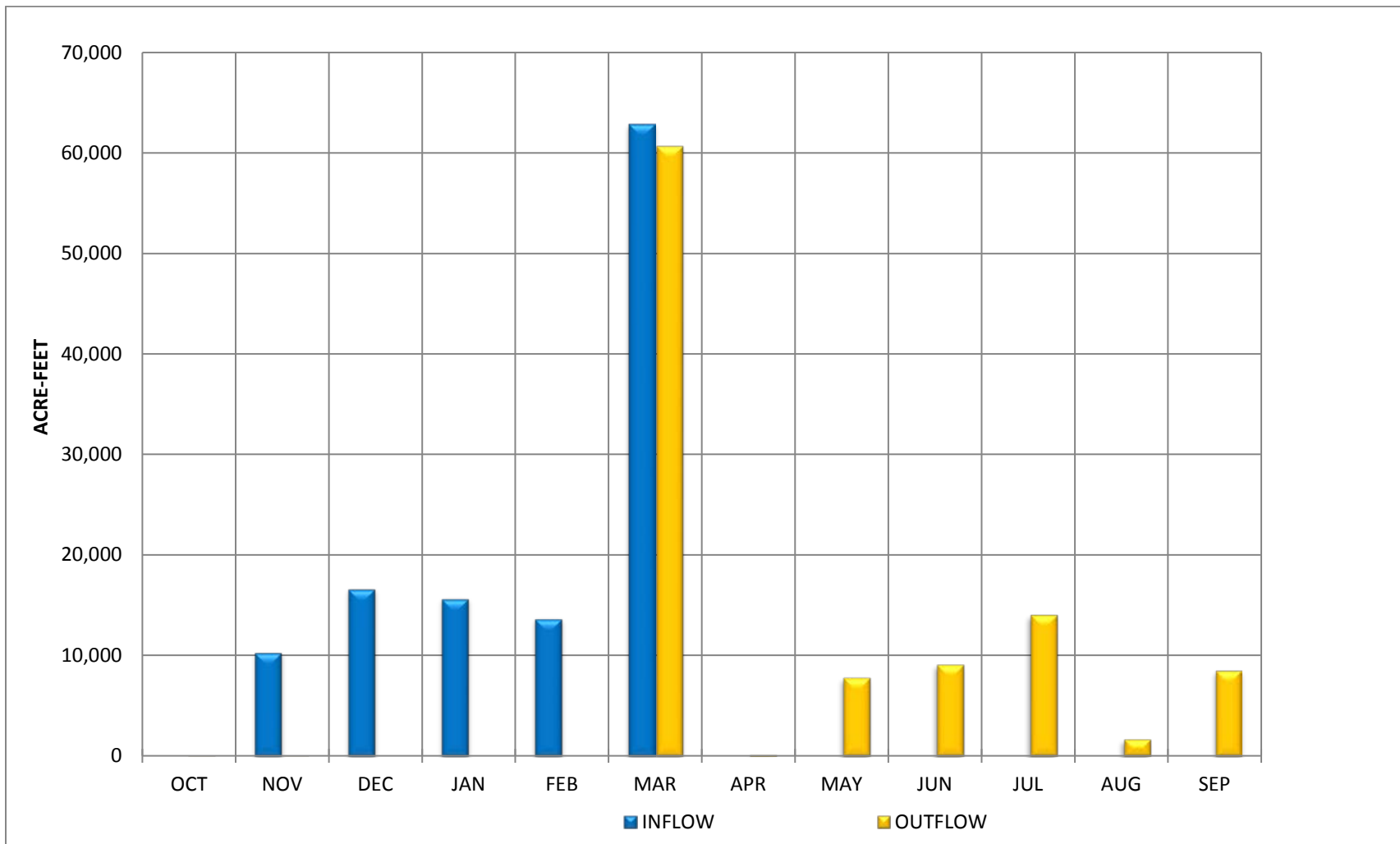


### 15. Pueblo Dam Monthly Precipitation WY2018

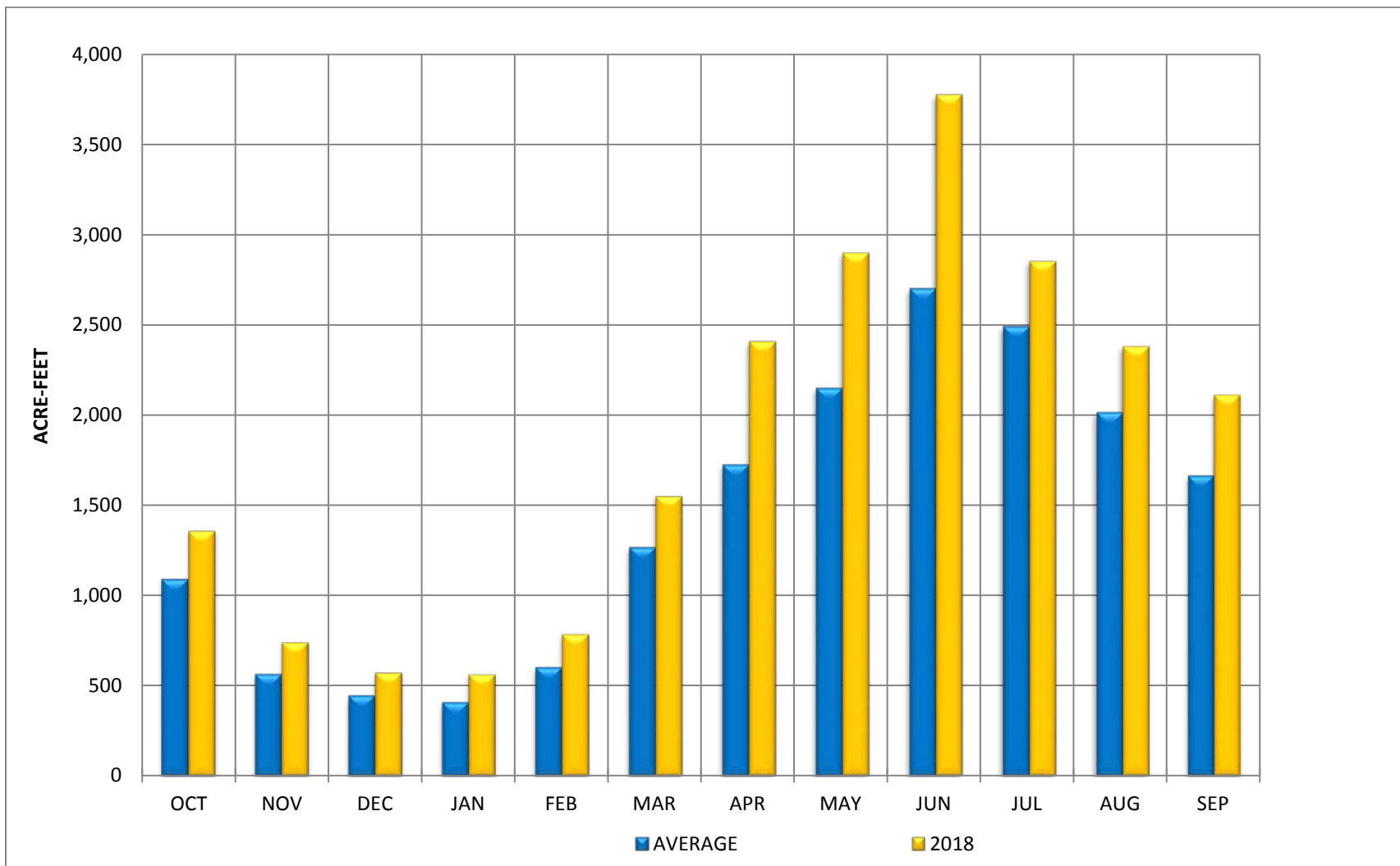




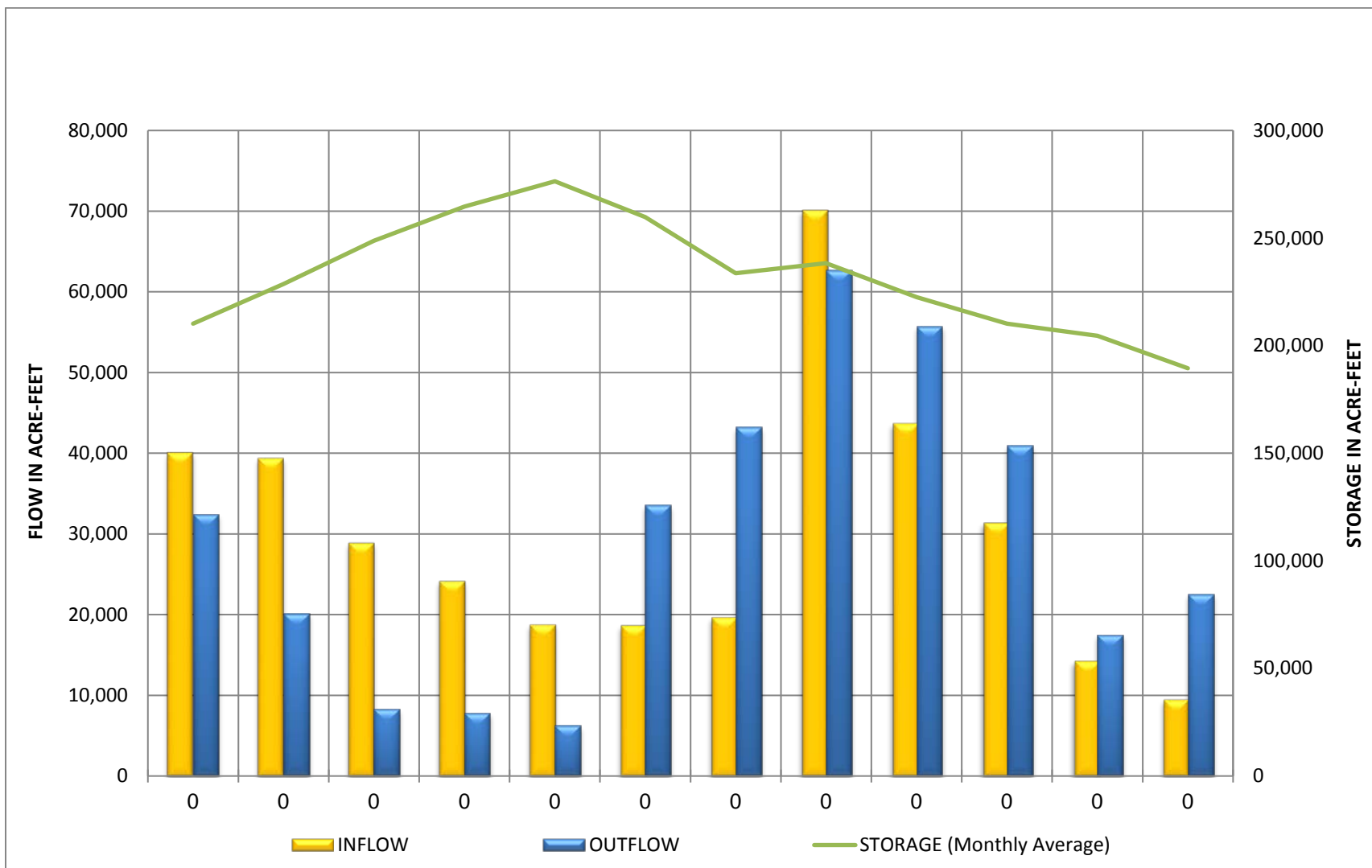
## 16. Pueblo Reservoir Winter Water WY2018



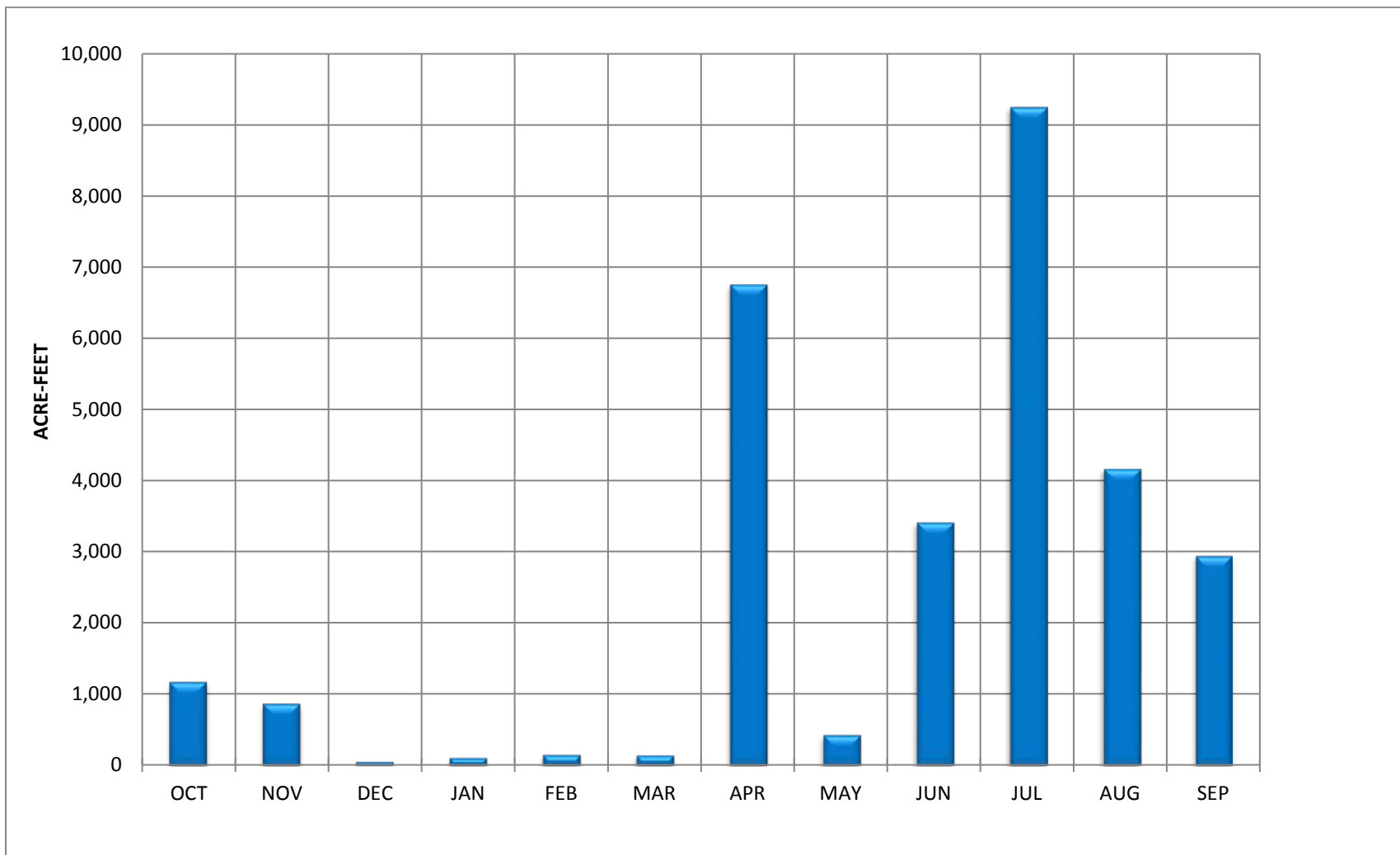
## 17. Pueblo Dam Monthly Evaporation WY2018



## 18. Pueblo Reservoir Actual Operations WY2018



## 19. Releases of Fryingpan-Arkansas Project Water WY2018



# Appendix C: Twin Lakes Reservoir And Canal Company Exchange With Fryingpan-Arkansas Project Water

## Twin Lakes Canal Company Exchange with Fryingpan-Arkansas Project Water WY2018

Units = Acre-Feet

	Lincoln Creek below Grizzly Reservoir (1)	Roaring Fork River above Lost Man (2)	Total Exchanged (3)	Twin Lakes Storage (3) x 1
Oct 2017	170.86	0	170.86	169.37
Nov 2017	90.13	51.57	141.70	140.47
Dec 2017	168.08	0	168.08	166.62
Jan 2018	163.77	0	163.77	162.35
Feb 2018	146.95	0	146.95	145.68
Mar 2018	166.15	0	166.15	164.70
Apr 2018	173.73	0	173.73	172.2
May 2018	119.11	0	119.11	118.07
Jun 2018	504.80	95.75	600.55	595.33
Jul 2018	1007.45	141.64	1149.09	1139.09
Aug 2018	0	0	0	0
Sep 2018	0	0	0	0
<b>Total</b>	<b>2711.04</b>	<b>288.96</b>	<b>3000.00</b>	<b>2973.88</b>

<sup>1</sup> Transit loss from the outlet of Twin Lakes Tunnel to Twin Lakes normally taken on all Twin Lakes Reservoir and Canal Company imported water.

Operating Criteria may prevent the total 3000 x 0.9913 from being stored

Please see the discussion in Chapter IV, Paragraph C for a full discussion of the Twin Lakes Canal Company Exchange in WY18

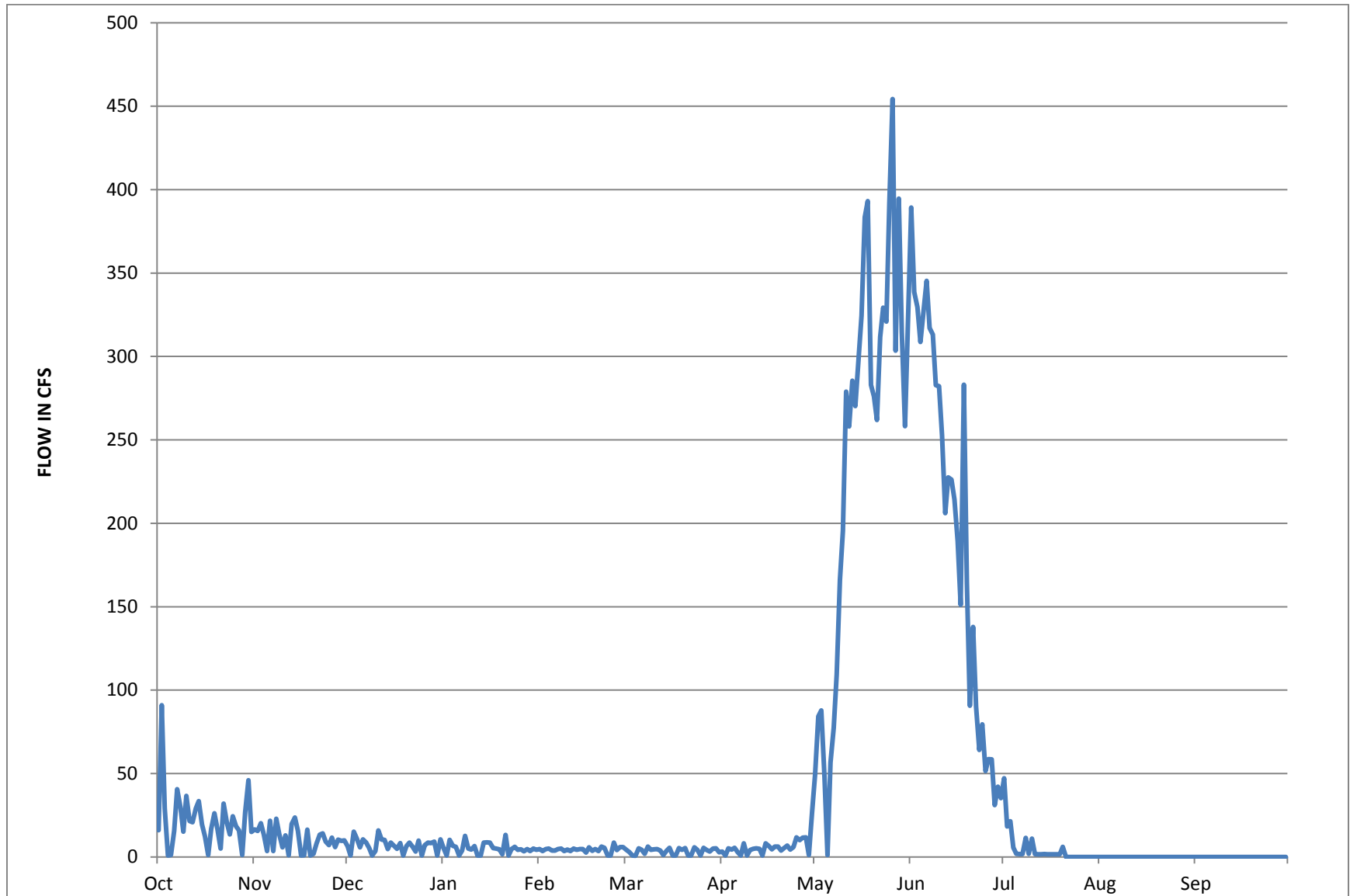
## Operating Criteria

1. The water exchange will be implemented October 1 through September 30.
2. The releases to the Roaring Fork River at the Roaring Fork Diversion Dam and Lincoln Creek at the Grizzly Diversion Dam shall be accounted as follows<sup>1</sup>:

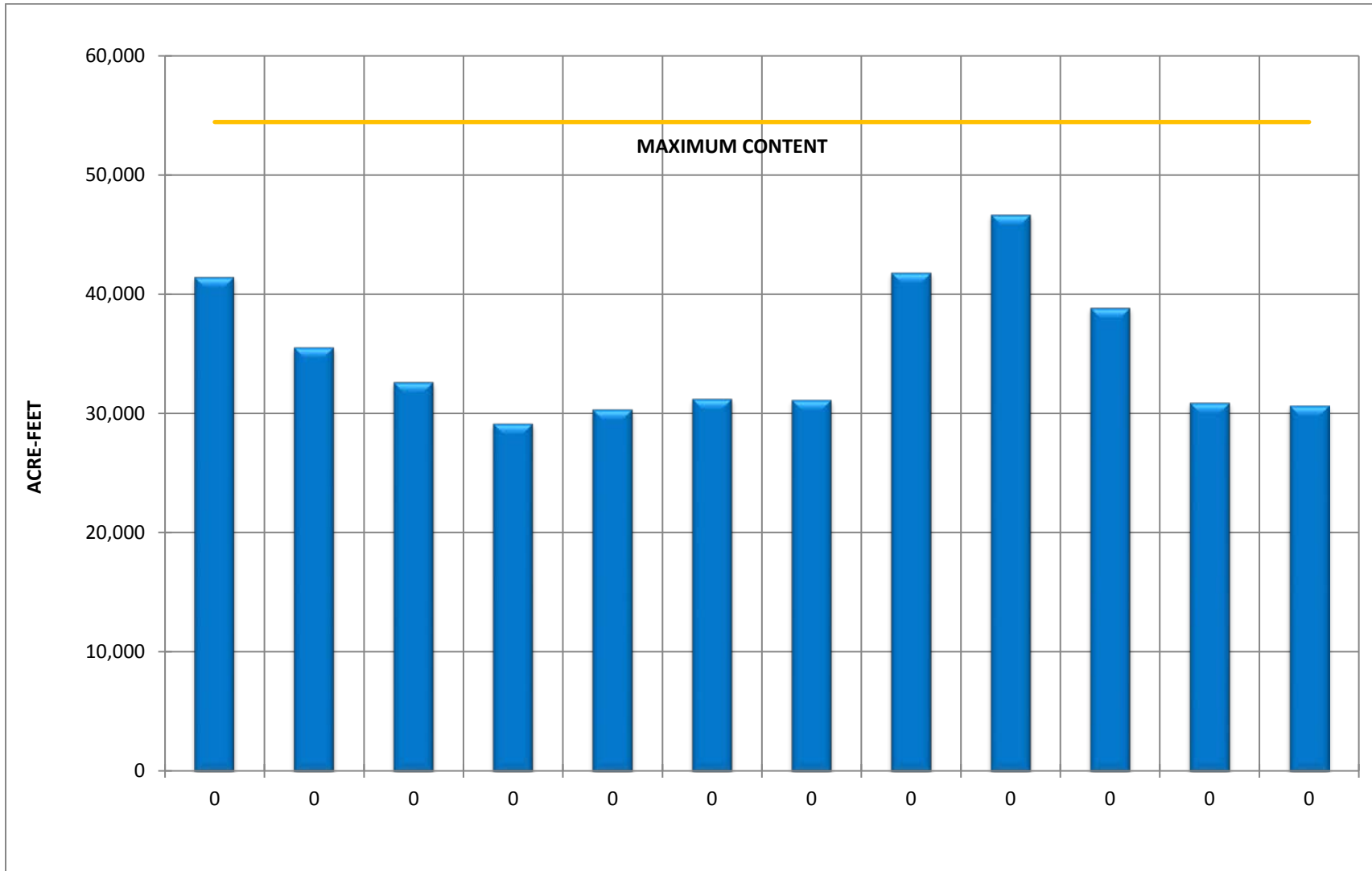
<u>Month</u>	<u>Grizzly Diversion (cfs)</u>	<u>Roaring Fork Diversion (cfs)</u>
October	3.0	0.0
November	3.0 (0 from 1-12 Nov)	0.0
December	3.0	0.0
January	3.0	0.0
February	3.0	0.0
March	3.0	0.0
April	3.0	0.0
May	3.0 (0 from 21 May to 18 Jun WY18)	0.0
June	4.0 (21.0 from 18 Jun to 3 Jul WY18)	4.0
July	4.0 (35.0 from 3 Jul to 19 Jul WY18)	4.0
August	4.0	3.0
September	4.0	3.0

3. At any time the Twin Lakes Reservoir and Canal Company (TLCC) is bypassing water, in addition to that designated above, it will be assumed that the Company could not have diverted that water and will not receive any credit for exchange in excess of the above amounts.
4. In the event less water than the above amounts is bypassed, only the amount actually bypassed will be credited.
5. The total volume of the release at both gages combined shall not exceed 3,000 acre-feet in any one water year.
6. No credit for exchange will be made on days when there is no documentation of such bypasses.
7. No credit will be given for water bypassed when diversions are called out by the State Engineer.

# Twin Lake Tunnel Imports WY2018



# Twin Lakes Canal Company Storage WY2018





# **Appendix D: Daily Discharge Records, Fryingpan-Arkansas Project Collection System**

## Carter Feeder Conduit near Norrie, CO

WY2018						
Unit: Cubic Feet per Second						
Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		5.5	29.4			
2		3.2	26.8			
3		2.5	26.7			
4		1.8	26.6			
5		3.6	26.5			
6		8.1	26.4			
7		13.1	26.3			
8		19.4	26.3			
9		25	26.2			
10		28.4	22.9			
11		32.5	22.4			
12		25.6	21.9			
13	0	24.3	24			
14	0	21.3	21.2			
15	0	20.3	17.4			
16	0	28.2	17			
17	0	33.8	21.8			
18	0	27.3	25.1			
19	0	22.7	10.3			
20	0	18.1	0.4			
21	0	19.9	0.4			
22	0	25	0.3			
23	0	25.5	0.2			
24	0	28.9				
25	0	32.2				
26	1.6	32.6				
27	5	29.3				
28	8.6	30.1				
29	9.1	21				
30	9	17.6				
31		26.2				
<b>TOTAL</b>	<b>33.4</b>	<b>653</b>	<b>446.5</b>			
<b>AVERAGE</b>	<b>1.6</b>	<b>21.1</b>	<b>19.4</b>			
<b>MAX</b>	<b>9.1</b>	<b>33.8</b>	<b>29.4</b>			

WY2018 Total: 2247.1 acre-feet

Maximum Instantaneous Peak: 44.4 cfs on 10 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# North Fork Fryingpan River Feeder Conduit near Norrie, CO

WY2018						
Unit: Cubic Feet per Second						
Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		1.5	12.9			
2		1.3	12.1			
3		1.4	11.8			
4		1.4	11.5			
5		1.4	11.2			
6		1.7	10.9			
7		2.2	10.5			
8		3.2	10.2			
9		5.2	9.9			
10		6.9	9.4			
11		8.5	8.3			
12		7.9	7.2			
13		7.9	6.7			
14		7.5	6.6			
15		7.8	6.3			
16		10	3			
17		11.9				
18		10.5				
19		8.9				
20		7.3				
21		7.1				
22		7.7				
23		8.7				
24		11.5				
25		14.3				
26		15				
27		13.1				
28		12.8				
29	0.8	10.3				
30	1.5	9.2				
31		11.1				
<b>TOTAL</b>	<b>2.3</b>	<b>235.2</b>	<b>148.4</b>			
<b>AVERAGE</b>	<b>1.15</b>	<b>7.6</b>	<b>9.3</b>			
<b>MAX</b>	<b>1.5</b>	<b>15</b>	<b>12.9</b>			

WY2018 Total: 765.8 acre-feet  
 Maximum Instantaneous Peak: 15.0 cfs on 26 May 18  
 Blank: Recorder not operated. No water diverted  
 M: Missing Data

# South Fork Fryingpan River Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second						
Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		9.5	55.6			
2		1	41.6			
3		0.8	39.2			
4		0.6	36.7			
5		0.7	34.3			
6		8.2	31.9			
7		24.4	29.4			
8		38.9	27.0			
9		53.1	24.5			
10		65.1	14.8			
11		77.6	10.9			
12		78	16.9			
13		77.2	21.6			
14		75.5	15.6			
15		80.8	8.6			
16		88.9	6.2			
17		97.2	9.9			
18		84.9	10.8			
19	0	70.1	6.6			
20	0	55.3	2.4			
21	0	64.4	1.9			
22	0	80.7	1.9			
23	0	91.8	1.9			
24	0	102.5	1.8			
25	0	113.2	1.7			
26	0	107.1				
27	1.6	110.4				
28	2.8	100.1				
29	5.4	68.3				
30	11.2	65.2				
31		72.6				
<b>TOTAL</b>	<b>21.1</b>	<b>1964.2</b>	<b>453.8</b>			
AVERAGE	1.8	63.4	18.2			
MAX	11.2	113.2	55.6			

WY2018 Total: 4838 acre-feet

Maximum Instantaneous Peak: 158.6.9 cfs on 27 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# Mormon Creek Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second

Source: Bureau of Reclamation

	April	May	June	July	August	September
1		6.3	34.2			
2		5.9	32.5			
3		4.7	31.3			
4		3.5	30.2			
5		3.6	29			
6		5.8	27.8			
7		10.4	26.7			
8		15.5	25.5			
9		23.3	24.3			
10		27.7	20			
11		31.2	20.2			
12		27.3	20.3			
13		27.2	20.1			
14		24.9	15.2			
15		28	11.6			
16		32.8	9.4			
17		34.1	11.3			
18		28.6	12			
19		24	10.8			
20		19.3	3.1			
21		20.9				
22		25.9				
23		26.7				
24		33.8				
25		40.9				
26		38.2				
27	1.7	36.6				
28	3.6	33.8				
29	4.4	26.2				
30	5.2	27.1				
31		33.2				
<b>TOTAL</b>	<b>14.9</b>	<b>727.4</b>	<b>415.5</b>			
AVERAGE	<b>3.7</b>	<b>23.5</b>	<b>20.8</b>			
MAX	<b>5.2</b>	<b>40.9</b>	<b>34.2</b>			

WY2018 total: 2296.5 acre-feet

Maximum Instantaneous Peak 56.3 cfs on 25 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# North Cunningham Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second  
Source: Bureau of Reclamation

	April	May	June	July	August	September
1		3.2	17.8			
2		3.3	17			
3		2.2	16.7			
4		1.1	16.3			
5		1.7	16			
6		3.1	15.6			
7		4.9	15.3			
8		8	14.9			
9		12.1	14.5			
10		14.5	13.7			
11		17.5	12.3			
12		15.7	10.9			
13		15.7	10.8			
14		14	9.5			
15		16	8.2			
16		17.6	3.1			
17		17.9	0.1			
18		15.4	0.1			
19		12.6	0.1			
20		9.7	0.1			
21		11.7	2.5			
22		14.5				
23		14.5				
24		17.5				
25		20.4				
26		18.7				
27	0.8	19.3				
28	2.1	16.8				
29	2.7	13.4				
30	2.9	13.9				
31		17.5				
<b>TOTAL</b>	<b>8.5</b>	<b>384.4</b>	<b>215.5</b>	<b>8.5</b>		
AVERAGE	<b>2.1</b>	<b>12.4</b>	<b>10.3</b>	<b>0.47222</b>		
MAX	<b>2.9</b>	<b>20.4</b>	<b>17.8</b>	<b>2.9</b>		

WY2018 Total: 1206.7 acre-feet

Maximum Instantaneous Peak: 31.4 cfs on 27 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# Middle Cunningham Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		0.6	23.7			
2		0.1	22.3			
3		0	21.8			
4		0	21.3			
5		0	20.7			
6		0.2	20.2			
7		1.1	19.7			
8		2.8	19.1			
9		5.4	18.6			
10		8.1	17.1			
11		11.7	15.1			
12		11.8	13.1			
13		12.1	12.3			
14		11.5	11.3			
15		13.9	10.1			
16		16.8	8.8			
17		17.9	9.6			
18		16.7	8.4			
19		14.1	6.5			
20		11.5	5.5			
21		13.9	1.3			
22		17.3				
23		18.5				
24		22.2				
25	0.1	25.9				
26	0.3	24.3				
27	0.6	24.9				
28	1	22.7				
29	1.3	17.9				
30	1.6	17.3				
31		22.1				
<b>TOTAL</b>	<b>4.9</b>	<b>383.3</b>	<b>306.5</b>			
<b>AVERAGE</b>	<b>0.8</b>	<b>12.4</b>	<b>14.6</b>			
<b>MAX</b>	<b>1.6</b>	<b>25.9</b>	<b>23.7</b>			

WY2018 Total: 1377.9 acre-feet

Maximum Instantaneous Peak: 36.3 cfs on 25 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# Ivanhoe Creek Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		7	77.5			
2		1.8	79.5			
3		1.6	76.1			
4		1.4	72.7			
5		1.4	69.4			
6		6.7	66			
7		15.7	62.6			
8		25.7	59.2			
9		36.1	55.9			
10		35.4	50.5			
11		41.8	40.2			
12		39.2	29.9			
13		37.6	22			
14		35.2	18.4			
15		35.8	15.2			
16		38.6	11.9			
17		38.6	13.2			
18		32.6	12			
19		27.4	7.6			
20		22.3	4.4			
21		25.5				
22		34.9				
23		45.2				
24		66.6				
25		88				
26		90.7				
27	2.2	90.6				
28	5.1	86.1				
29	6.9	74.3				
30	8.4	70				
31		75.2				
<b>TOTAL</b>	<b>22.6</b>	<b>1229</b>	<b>884.2</b>			
<b>AVERAGE</b>	<b>5.65</b>	<b>39.6</b>	<b>42.2</b>			
<b>MAX</b>	<b>8.4</b>	<b>90.7</b>	<b>90.7</b>			

WY2018 total: 4180.6 acre-feet  
 Maximum Instantaneous Peak 116.1 cfs on 25 May 18  
 Blank: Recorder not operated. No water diverted  
 M: Missing Data



# Lily Pad Creek Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		3.7	1.8			
2		3.8	1.6			
3		3.8	1.7			
4	2.1	3.8	1.9			
5	2.4	3.9	1.6			
6	2.5	3.9	1.5			
7	2.6	4	1.4			
8	2.7	4	1.3			
9	2.8	2.7	1.1			
10	2.9	1.1	1			
11	2.9	1.6	0.9			
12	3	1.8	0.7			
13	3.1	2	0.7			
14	3.1	2.2	0.7			
15	3.1	2.4	0.6			
16	3.2	2.6	0.6			
17	3.3	2.9	0.8			
18	3.3	2.9	0.7			
19	3.3	2.1	0.4			
20	3.3	1.8				
21	3.4	2.1				
22	3.4	2.5				
23	3.4	2.6				
24	3.5	2.7				
25	3.5	2.9				
26	3.5	2.6				
27	3.6	2.6				
28	3.6	2.1				
29	3.6	1.7				
30	3.7	1.8				
31		2				
<b>TOTAL</b>	<b>84.8</b>	<b>82.6</b>	<b>21</b>			
<b>AVERAGE</b>	<b>3.1</b>	<b>2.7</b>	<b>1.1</b>			
<b>MAX</b>	<b>3.7</b>	<b>4.0</b>	<b>1.9</b>			

WY2018 Total: 373.7 acre-feet

Maximum Instantaneous Peak: 4.18 cfs on 25 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# Granite Creek Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		0.3	17.2	2		
2		0.3	16.2	1.9		
3		0	15.7	15.5		
4		0	15.2	1.6		
5		0.1	14.7	1.7		
6		0.5	14.2	1.7		
7		1.2	13.7	2		
8		2.4	13.1	1.9		
9		3.7	12.6	1.6		
10		5.5	11.7	1.5		
11		8.4	10.7	1.4		
12		8.4	9.8	1.3		
13		7.5	9.5	1.2		
14		8.3	9.4	1.1		
15		7.6	8.6	2.7		
16		6.1	8.2	2.2		
17		4.9	9	1.5		
18		5.8	7.9	1.3		
19		6.7	6.4	1.1		
20		7.5	5.6	1		
21		6.2	4.9	0.9		
22		4.7	4.6	0.8		
23		4.6	4	0.8		
24		10.3	3.5	0.8		
25		16	3.2	0.7		
26		20.4	3	0.7		
27		20.5	2.9	0.6		
28		18.1	2.6	0.6		
29	0.2	15	2.4	0.6		
30	0.3	16.2	2.1	0.5		
31		18.8				
<b>TOTAL</b>	<b>0.5</b>	<b>236.0</b>	<b>262.6</b>	<b>53.2</b>		
<b>AVERAGE</b>	<b>0.3</b>	<b>7.6</b>	<b>8.8</b>	<b>1.8</b>		
<b>MAX</b>	<b>0.3</b>	<b>20.5</b>	<b>17.2</b>	<b>15.5</b>		

WY2018 Total: 990.0 acre-feet

Maximum Instantaneous Peak: 31.3 cfs on 25 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# No Name Creek Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second  
Source: Bureau of Reclamation

	April	May	June	July	August	September
1		0	24.7			
2		0	21			
3		0	19			
4		0	17.1			
5		0	15.1			
6		0	13.1			
7		4.9	11.1			
8		8.9	9.2			
9		14.6	7.2			
10		17.7	5.4			
11		23.7	1.5			
12		25.4				
13		26.9				
14		27				
15		27.9				
16		33.3				
17		36.3				
18		32.3				
19		28.7				
20		25.1				
21		27.4				
22		33.4				
23		34.8				
24		36				
25		37.2				
26		32.7				
27		30.9				
28		29.6				
29		23.1				
30		23.9				
31		27.2				
<b>TOTAL</b>		<b>660.5</b>	<b>144.4</b>			
<b>AVERAGE</b>		<b>21.3</b>	<b>13.1</b>			
<b>MAX</b>		<b>37.2</b>	<b>24.7</b>			

WY2018 Total: 1596.5 acre-feet.

Maximum Instantaneous Peak: 56.9 on 25 May 18

Blank: Recorder not operated.

M: Missing Data

# Midway Creek Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		3.1	66.9			
2		2.9	61.2			
3		2.8	58			
4		2.7	54.9			
5		2.5	51.8			
6		2.4	48.6			
7		7.4	45.5			
8		14.6	42.3			
9		22.3	39.2			
10		28.3	34			
11		35.2	28.9			
12		37.6	25.8			
13		38.3	25.3			
14		38.9	23.6			
15		42.3	20.8			
16		51.7	20.7			
17		54.5	33.9			
18		50	25.6			
19		45.7	9.5			
20		41.5				
21		45.9				
22		52.8				
23		56.6				
24		62.3				
25	0	68				
26	0	66.3				
27	0	66.2				
28	0	65.9				
29	1.6	54.2				
30	3.9	58.5				
31		66				
<b>TOTAL</b>	<b>5.5</b>	<b>1187.4</b>	<b>716.7</b>			
<b>AVERAGE</b>	<b>0.9</b>	<b>38.3</b>	<b>23.9</b>			
<b>MAX</b>	<b>3.9</b>	<b>68.0</b>	<b>66.9</b>			

WY2018 Total: 3787.7 acre-feet.

Maximum Instantaneous Peak: 92.2 cfs on 27 May 18

Blank: Recorder not operated.

M: Missing Data

# Hunter Creek Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second  
Source: Bureau of Reclamation

	April	May	June	July	August	September
1		3.1	48.7			
2		2.9	44.1			
3		2.8	41.9			
4		2.7	39.8			
5		2.5	37.6			
6		2.4	35.5			
7		7.4	33.3			
8		14.6	31.2			
9		22.3	29			
10		28.3	23.2			
11		35.2	19.1			
12		37.6	16.9			
13		38.3	18.1			
14		38.9	14.3			
15		42.3	10.2			
16		51.7	3.2			
17		54.5				
18		50				
19		45.7				
20		41.5				
21		45.9				
22		52.8				
23		56.6				
24	0	62.3				
25	0	68				
26	0	66.3				
27	0	66.2				
28	0	65.9				
29	0	54.2				
30	0	58.5				
31		66				
<b>TOTAL</b>	<b>0.0</b>	<b>1175.7</b>	<b>446.1</b>			
AVERAGE	<b>0.0</b>	<b>37.9</b>	<b>14.9</b>			
MAX	<b>0.0</b>	<b>66.0</b>	<b>48.7</b>			

WY2018 Total: 3227.8 acre-feet

Maximum Instantaneous Peak: 82.7 cfs on 23 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# Sawyer Creek Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second  
Source: Bureau of Reclamation

	April	May	June	July	August	September
1			21.6	3.1		
2			20	2.9		
3			19.9	2.7		
4			21	2.5		
5			20.7	2.4		
6			20.2	2.3		
7			18.6	2.1		
8			17.5	2.1		
9			16.4	2		
10			15.4	1.9		
11			13.8	1.8		
12			12.4	1.7		
13			11.7	1.7		
14			11.5	1.5		
15			10.8	1.6		
16			10.4	1.5		
17			11.6	1.3		
18			11.4	1.2		
19			9.5			
20			8.2			
21		12.1	7.3			
22		14.1	6.6			
23		16.1	6			
24		18.7	5.4			
25		22.3	4.9			
26		22.4	4.5			
27		22.2	4.2			
28		22.2	4			
29		18.9	3.6			
30		17.8	3.4			
31		20.5				
<b>TOTAL</b>		<b>207.3</b>	<b>352.5</b>	<b>36.3</b>		
<b>AVERAGE</b>		<b>18.8</b>	<b>11.8</b>	<b>2.0</b>		
<b>MAX</b>		<b>22.4</b>	<b>21.6</b>	<b>3.1</b>		

WY2018 Total: 1231.2

acre-feet

Maximum Instantaneous Peak: 28.1 cfs on 27 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# Chapman Gulch Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		7.3	213.4			
2		1.6	193.5			
3		0	183.3			
4		0	173.1			
5		0	162.9			
6		5.3	152.7			
7		24.8	142.5			
8		55.7	132.3			
9		93.1	122.1			
10		111.4	105.4			
11		140.9	87.6			
12		144.3	67.8			
13		149.6	62.9			
14		145.5	60			
15		153.8	49.7			
16		188	44.1			
17		212.3	65.4			
18		194.5	53.4			
19		174.6	27.4			
20		154.7	10			
21		161.9	4			
22		192.8				
23		206.2				
24		221.9				
25		237.6				
26		234.9				
27	0.5	225.6				
28	1.7	220				
29	3.6	180.1				
30	6.6	186.8				
31		218.6				
<b>TOTAL</b>	<b>5.8</b>	<b>3876.7</b>	<b>2113.5</b>			
<b>AVERAGE</b>	<b>1.5</b>	<b>125.1</b>	<b>100.6</b>			
<b>MAX</b>	<b>3.6</b>	<b>237.6</b>	<b>213.4</b>			

WY2018 Total: 11893.1 acre-feet

Maximum Instantaneous Peak: 304.4 cfs on 27 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data

# Fryingpan River Feeder Conduit near Norrie, CO

WY2018

Unit: Cubic Feet per Second Source: Bureau of Reclamation						
	April	May	June	July	August	September
1		10.3	72			
2		2.9	66.1			
3		1.8	61.7			
4		0.8	57.4			
5		3.1	53			
6		12.6	48.7			
7		34.6	44.4			
8		56.3	40			
9		72.4	35.7			
10		93.5	29.7			
11		106.6	23.3			
12		106.7	17			
13		109	17.2			
14		106.1	15.7			
15		110.5	12.7			
16		119	10.7			
17		127.4	18			
18		111.9	20.7			
19		101.7	15.6			
20		91.6	7.5			
21		100.2	7			
22		111.1				
23		112				
24		123.3				
25	0.4	134.6				
26	0.8	127.2				
27	3.7	121.5				
28	9.6	112.8				
29	15.1	89				
30	16.9	82.8				
31		89.4				
<b>TOTAL</b>	<b>46.1</b>	<b>2582.7</b>	<b>674.1</b>			
<b>AVERAGE</b>	<b>9.2</b>	<b>83.3</b>	<b>32.1</b>			
<b>MAX</b>	<b>16.9</b>	<b>134.6</b>	<b>72.0</b>			

WY2018 Total: 6551.3 acre-feet

Maximum Instantaneous Peak: 178 cfs on 25 May 18

Blank: Recorder not operated. No water diverted

M: Missing Data



# **Appendix E: Fryingpan-Arkansas Project Operating Principles**

OPERATING PRINCIPLES  
FRYINGPAN-ARKANSAS PROJECT

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ADOPTED BY THE STATE OF COLORADO

APRIL 30, 1959

(As amended December 30, 1959,  
and December 9, 1960)

MARCH 15, 1961----Ordered to be printed

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U. S. GOVERNMENT PRINTING OFFICE  
WASHINGTON: 1961

H. RES. 91

In the House of Representatives, U. S.,  
March 15, 1961.

Resolved, That there be printed as a House document the publication entitled “Operating Principles, Fryingpan-Arkansas Project, Adopted by the State of Colorado, April 30, 1959 (as amended December 30, 1959, and December 9, 1960)”, and that there be printed for the use of the Committee on Interior and Insular Affairs one thousand additional copies.

Attest:

Ralph R. Roberts, Clerk.

OPERATING PRINCIPLES, FRYINGPAN-ARKANSAS PROJECT

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ADOPTED BY THE STATE OF COLORADO, APRIL 30, 1959

(As Amended December 30, 1959, and December 9, 1960)

The construction and operation of the project involve the diversion of water from the headwaters of the Fryingpan River and other tributaries of the Roaring Fork River to the Arkansas River Basin. The project contemplates—

- (a) The maximum conservation and use of water;

- (b) The protection of western Colorado water uses, both existing and potential, in accordance with the declared policy of the State of Colorado; and
- (c) The preservation of recreational values.

In order to accomplish such purposes, the project shall be operated by the United States in compliance with the Federal reclamation laws, the laws of the State of Colorado relating to the appropriation, use, or distribution of water, and the following operating principles:

1. As used herein:
  - (a) "Project" means that certain enterprise planned and designed by the Bureau of Reclamation, Department of the Interior, for the transmountain diversion of water from the headwaters of the Fryingpan River and other tributaries of the Roaring Fork River to the basin of the Arkansas River, together with all of its appurtenant works and facilities in both eastern and western Colorado.
  - (b) "Eastern Colorado" means that portion of the State of Colorado lying within the natural drainage basin of the Arkansas River.
  - (c) "Western Colorado" means that portion of the State of Colorado lying within the natural drainage basin of the Colorado River and served by diversions made from the Colorado River, or its tributaries, above its confluence with the Gunnison River.
  - (d) "Southeastern Colorado Water Conservancy District" means that entity created to contract for payment to the United States of an appropriate portion of project cost allocated to certain water uses in eastern Colorado.
  - (e) "Colorado River Water Conservation District" means that entity created by Colorado Revised Statutes 1953, 149-8, as amended.
  - (f) "Southwestern Water Conservation District" means that entity created by Colorado Revised Statutes 1953, 149-9, as amended.
  - (g) "Ruedi Reservoir" means the reservoir presently planned for construction on the Fryingpan River above the town of Basalt as part of the project.
  - (h) "Ashcroft Reservoir" means not only the reservoir contemplated for construction on Castle Creek, a tributary of the Roaring Fork River, but also, unless the context requires otherwise, any other reservoir that may be constructed in the Roaring Fork basin above the town of Aspen in lieu of that reservoir.
  - (i) "cfs" means cubic feet of water per second of time.
2. The Ruedi Reservoir shall be constructed and maintained on the Fryingpan River above the town of Basalt with an active capacity of not less than 100,000 acre-feet. In addition thereto and in order to offset adverse streamflow conditions on the Roaring Fork River above the town of Aspen which might occur as a result of the project enlargement of the Twin Lakes Reservoir, the Ashcroft Reservoir on Castle Creek, or some reservoir in lieu thereof, shall be constructed on the Roaring Fork drainage above Aspen to a capacity of approximately 5,000 acre-feet: Providing, However, That the Ashcroft Reservoir shall be constructed only if the Secretary of the Interior after appropriate study shall determine that its benefits exceed the costs: And providing further, That no part of the construction, operation, or maintenance of said Ashcroft Reservoir shall be chargeable to the Fryingpan-Arkansas project.  
All of such stored water shall be released under the conditions and limitations hereinafter set forth.
3. The receipts from the sale of water from Ruedi Reservoir, as permitted in paragraph 6(b) hereof, shall be applied solely to the operation and maintenance costs and to those

reimbursable construction costs of said reservoir which exceed \$7,600,000. The cost of perpetual operation and maintenance of the Ruedi Reservoir shall be borne by users of project water and users of water stored in Ruedi Reservoir in such proportion as may be determined by the Secretary of the Interior.

4. The inclusion of the Ruedi Reservoir in the project shall not preclude the construction of any other replacement or regulatory reservoirs on the Colorado River or its tributaries above Cameo gaging station.
5. The Ruedi Reservoir shall be completed and in operation before any water is diverted to eastern Colorado by means of the project.
6.
  - (a) The replacement capacity of Ruedi Reservoir, and any reservoir constructed in addition thereto, is that portion of the total reservoir capacity required to permit project diversions at times when such diversions could not otherwise be made because of simultaneous demands of senior diversions in western Colorado existing at the time of the adoption of these operating principles, and shall be so operated to accomplish this purpose. Water stored in such capacity shall be released by the United States, upon the request of the Colorado State engineer, to the extent that water would have been available to said decreed rights except for stream depletion resulting from diversions by this project to the Arkansas Valley.
  - (b) The regulatory capacity of Ruedi Reservoir, and any reservoir constructed in addition thereto, is that portion of the total reservoir capacity not needed for replacement purposes. Water stored in such category may be sold or leased by the United States to water users in Colorado for any purpose recognized by the laws of the United States: Provided, That the sale of water for use outside the natural basin of the Colorado River can only be made with the consent of the Colorado River Water Conservation District. Charges for the use of such water shall be established by the Secretary of the Interior by appropriate contract in accordance with the payment ability of such water users.
7. The primary purpose of Ruedi Reservoir, and any reservoir constructed in addition thereto, is to furnish, to the extent of its capacity, in like manner as if the project were constructed by a water conservancy district organized pursuant to the laws of the State of Colorado, the water required for the protection of western Colorado water users by the provisions of Colorado Revised Statutes 1953, 149-6-13, reading as follows:  
However, any works or facilities planned and designed for the exportation of water from the natural basin of the Colorado River and its tributaries in Colorado, by any district created under this article, shall be subject to the provisions of the Colorado River Compact and the Boulder Canyon Project Act. Any such works or facilities shall be designed, constructed and operated in such a manner that the present appropriations of water, and in addition thereto prospective uses of water for irrigation and other beneficial consumptive use purposes, including consumptive uses for domestic, mining, and industrial purposes, within the natural basin of the Colorado River in the State of Colorado, from which water is exported, will not be impaired nor increased in cost at the expense of the water users within the natural basin. The facilities and other means for the accomplishment of said purpose shall be incorporated in, and made a part of any project plans for the exportation of water from said natural basin in Colorado.
8. Project diversions from Lime Creek shall be made only in the months of May and June of each year, unless the Colorado River Water Conservation District shall, by written communication, advise the Colorado State engineer that additional diversions can be made.

9 The respective decrees which may be or have been awarded to the parties hereto as a part of the Fryingpan-Arkansas project and Basalt project shall be administered by the proper officials of the State of Colorado, in accordance with the applicable laws of the State of Colorado, and with the following principles and procedures, to wit:

- (1) That the demand on the waters available under such decrees shall be allocated in the following sequence:
  - (a) For diversion to the Arkansas Valley through the collection system and the facilities of the Fryingpan-Arkansas project in an amount not exceeding an aggregate of 120,000 acre-feet of water in any year, but not to exceed a total aggregate of 2,352,800 acre-feet in any period of 34 consecutive years reckoned in continuing progressive series starting with the first full year of diversions, both limitations herein being exclusive of Roaring Fork exchanges as provided in (c) below, and exclusive of diversions for the Busk-Ivanhoe decree; and with the further and absolute limitation that in order to protect existing and future beneficial uses of water in Western Colorado, including recreational and fishing values, the State engineer shall so regulate the transmountain diversions above referred to, to the end that no diversions shall be made which will reduce the remaining aggregate streamflows to less than either of the following minimum standards:
    - (i) The Fryingpan collection system at the points of diversion collectively, exclusive of Lime Creek: 15 cfs October 1 through March 31; 30 cfs April 1 through September 30.
    - (ii) Near Norrie (immediately below the junction of North Fork and Fryingpan River): 30 cfs October 1 through March 31; 100 cfs April 1 through April 30; 150 cfs May 1 through May 31; 200 cfs June 1 through June 30; 100 cfs July 1 through July 31; 75 cfs August 1 through August 31; 65 cfs September 1 through September 30.
- In maintaining the above minimum standards, the project diversions shall be regulated, so far as is practicable, in such a manner that the North Fork of the Fryingpan River, the Fryingpan River, and each of the tributaries of those streams, shall contribute to the residual streamflows required by those minimum standards quantities of water in proportion to their natural contributions.
  - (b) For storage in Ruedi Reservoir to the extent of its actual capacity, which is to be not less than 100,000 acre-feet.
  - (c) For 3,000 acre-feet annually, to the extent that it is available in excess of (a) and (b) above, or such part thereof as may be required, to be delivered to the Twin Lakes Reservoir and Canal Company in exchange for equivalent releases from the headwaters of the Roaring Fork River which would otherwise be diverted through such Twin Lakes Reservoir and Canal Company collection and diversion system.
  - (d) For any other beneficial use in western Colorado in accordance with court decree, but not herein contemplated.
- (2) The effectuation of the above principles requires concurrent Fryingpan-Arkansas project diversion and Ruedi Reservoir storage to be accomplished in the manner following: The State engineer annually shall collect pertinent data, including

information pertaining to snowpack and all other available evidence, and shall thereafter so divide and apportion the surface runoff as to achieve, as nearly as possible, the foregoing division of water and the maximum of concurrent diversions and storage. The diversions herein contemplated shall be on the basis of a water year hereby defined as that interim of October 1 through the following September 30.

10. For the protection of recreational values, including fishing, on the Fryingpan River below Ruedi Reservoir, releases of water from said reservoir, not to exceed the stream inflow, shall be made so that the streamflow immediately below the junction of the Fryingpan River and Rocky Fork shall not be reduced below 39 cfs from November 1 to April 30, and 110 cfs from May 1 to October 30, or as actual experience or court decree hereafter dictate.
11. An appropriate written contract may be made whereby Twin Lakes Reservoir and Canal Company shall refrain from diverting water whenever the natural flow of the Roaring Fork River and its tributaries shall be only sufficient to maintain a flow equal to or less than that required to maintain the recommended average flows in the Roaring Fork River immediately above its confluence with Difficult Creek in a quantity proportionate to the respective natural flow of the Roaring Fork River. The recommended average flows above mentioned are flows in quantities equal to those recommended as a minimum immediately above its confluence with Difficult Creek according to the following schedule submitted by the United States Fish and Wildlife Service and the Colorado Game and Fish Commission:

Month	Average Second-feet (thousands)	Acre-feet	Month	Average Second-feet (thousands)	Acre-feet
October	44	2.7	May	100	6.2
November	35	2.1	June	120	7.1
December	29	1.8	July	100	6.2
January	26	1.6	August	63	3.9
February	25	1.4	September	44	<u>2.6</u>
March	24	1.5			
April	64	3.8	Total	----	40.9

In maintaining the above averages, at no time shall the flow be reduced below 15 cfs during the months of August to April, inclusive, or below 60 cfs during the months of May to July, inclusive, providing the natural flow during said period is not less than these amounts. The obligation to supply the minimum streamflow as set forth in the above table on the Roaring Fork River shall, to the extent of 3,000 acre-feet annually, be a project obligation to be supplied from any waters diverted from the south tributaries of Hunter Creek, Lime Creek, Last Chance Creek, or any of them.

The Twin Lakes Reservoir and Canal Company shall not be required to refrain from diverting water under its existing decrees from the Roaring Fork River except to the extent that a like quantity of replacement water is furnished to said company without charge therefore through and by means of project diversions and storage.

If by reason of storage capacity in the Ruedi Reservoir, or any reservoir constructed in addition thereto, the Twin Lakes Reservoir and Canal Company derives additional water or other benefits or advantages it would not have realized had this project not been constructed, then nothing herein contained shall prevent the project from making appropriate charges for such water or other benefits or advantages. All revenues derived from the use of water stored in Ashcroft Reservoir shall be used to assist in the repayment of the construction, operation, and maintenance costs of that reservoir, or any reservoir constructed in lieu thereof, as may be determined by the Secretary of the Interior.

12. All lands acquired and held for project construction and operation and water surfaces of project reservoirs will be open to the public for recreational purposes, excepting those areas reserved by the operating agency.
13. The project will be operated in such a manner that those in eastern Colorado using project water imported from the Colorado River Basin for domestic purposes shall have preference over those claiming or using water for any other purpose.
14. The project is to be operated in such a manner as to secure the greatest benefit from the use and reuse of imported project waters within project boundaries in the State of Colorado
15. Any and all benefits and rights of western Colorado water users in and to water stored in Green Mountain Reservoir, as described and defined in Senate Document 80, 75<sup>th</sup> Congress, 1<sup>st</sup> session, shall not be impaired or diminished by this project.
16. The project, its operation, maintenance, and use shall be subject to the provisions of the Upper Colorado River Basin Compact of October 11, 1948 (Public Law 37, 81<sup>st</sup> Congress, 1<sup>st</sup> session), and the Colorado River Compact of November 24, 1922 (House Document 605, 67<sup>th</sup> Congress, 4<sup>th</sup> session).
17. The Colorado River Water Conservation District of the State of Colorado shall acquire title to storage of water in Ruedi Reservoir and any reservoir constructed in addition thereto, by appropriate proceedings in the courts of the State of Colorado. The Southeastern Colorado Water Conservancy District of the State of Colorado shall likewise acquire title to the water required by the project for diversion to the Arkansas Valley. The Secretary of the Interior shall at any time after the authorization of the project have the option to obtain or require the transfer to the United States of any and all rights initiated or acquired by appropriation as herein set forth: Provided, however, That the rights so taken shall be subject to a beneficial use of such water as may be provided in the repayment contract or contracts, and subject to all the operating principles herein set forth.
18. No transmountain diversion of water shall ever be made through the collection and diversion system of the Fryingpan-Arkansas Project in excess of the quantitative limitations and conditions established by this document: Provided, however, That when under the laws of the State of Colorado, there may be additional water available for such collection and diversion which is not at the time of diversion required for beneficial use in western Colorado or for filling interstate water compact agreements, then such water may be collected and diverted for beneficial use in the Arkansas Valley: Provided further, That such additional diversion shall only be made with the mutual consent of each of the following agencies of the State of Colorado, to wit: the Colorado Water Conservation Board, the Southwestern Water Conservation District,

the Colorado River Water Conservation District, and the Southeastern Colorado Water Conservancy District.

19. To assure project operation in conformity with the operating principle heretofore stated, to provide a means for the collection and interchange of information, and to provide a method for the continued study of project operations to the end that, if the stated operating principles may be improved upon, recommendations for changes may be made to the contracting parties, a commission shall be created in an appropriate manner to be composed of one representative of the Southeastern Colorado Water Conservancy District, one representative of the Colorado River Water Conservation District, two representatives of the United States, and one representative of the State of Colorado appointed by the Colorado Water Conservation Board after consultation with the Colorado Game and Fish Commission. The powers of such commission shall be limited to the collection of data, the making of findings of fact, and the suggestion of changes in operating principles.

These operating principles shall be deemed to have amended and take the place of those operating principles signed and executed on April 30, 1959. These operating principles shall be and do constitute a contract between the signatory parties, and shall inure to the benefit of and shall be and remain binding upon said parties, their respective successors and assigns.

Executed as amended at Denver, Colorado, this 9<sup>th</sup> day of December 1960.

COLORADO WATER CONSERVATION BOARD  
Steve McNichols, Chairman;  
Governor, State of Colorado

Attest:

Felix L. Sparks,  
Director and Secretary

SOUTHEASTERN COLORADO WATER CONSERVANCY  
DISTRICT  
By J. Selby Young, President

Attest:

J. G. Shoun,  
Secretary

COLORADO RIVER WATER CONSERVATION DISTRICT  
By A. Allen Brown, President

Attest:

Philip P. Smith,  
Secretary

SOUTHWESTERN WATER CONSERVATION DISTRICT  
By Ira E. Kelly, President

Attest:

Archie B. Toner,  
Secretary